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"I cannot help plead to my countrymen, at every opportunity, to cherish all that is manly and noble in the military profession, because Peace is enervating and no man is wise enough to foretell when soldiers may be in demand again."—SHERMAN.

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Prize Essay.*

BASED ON PRESENT CONDITIONS AND PAST EXPERIENCES, HOW SHOULD OUR VOLUNTEER ARMIES BE RAISED, ORGANIZED, TRAINED, AND MOBILIZED FOR FUTURE WARS.

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IN the treatment of this subject it is proposed to take a glance at the American colonial wars and the four great wars of the United States, paying special attention to the Civil War as being of far greater magnitude than the others and nearer our own times; then, taking up the subject of officers of volunteers, to show how they have previously been appointed, the importance of their duties, and the necessity of having them trained and ready to take their positions at the first call for volunteers; next, to glance at present conditions in order to see how many men we can place in the field without calling out volunteers, how many troops could be sent against us across sea at one time, and so determine how many volunteers we should

* Board of Award. General Wesley Merritt, U. S. Army; Governor U. A. Woodbury of Vermont, and Colonel H. W. Closson, U. S. Army.

The small figures throughout the article refer to notes which will be found collected at the end of the essay.

need to carry on a war; then, considering the nature of the duties required of officers and men in each branch of the service in present times, the time that has heretofore been required to prepare raw levies for a campaign and the time required by a foreign nation to develop an armed attack upon us, we shall determine the length of time in which we must be able to prepare for war and the means by which we can accomplish the preparation, thus developing a system answering the above title. Then will follow a comparison between the system proposed and that previously in force, a brief discussion of the subject of conscription and a few closing paragraphs stating what are believed to be some of the advantages of the system here outlined.

No people in the world have a greater admiration for deeds of military heroism, are prouder of their own military history, are readier to honor their great soldiers, than Anglo-Saxons. The most popular novels and poems in their literature are those which abound in heroic deeds, in which the scene shifts from knightly joust and tournament to lady's bower, from camp to social circle, from "sounds of revelry by night" to "battle's stern array." Even ministers of the gospel love to employ imagery of war, to picture the faithful Christian as the loyal soldier and Christ himself as the Great Captain.

Yet Anglo-Saxons have always professed to have a sort of antipathy towards a standing army. Great nobles looked upon it as a rival power; the common people as an instrument of oppression. But under the conditions of the nineteenth century it is believed that the root of nearly all objections to a large standing army lies in the heavy taxation necessary for its support.

While, during the present century, conscription has been the rule for obtaining recruits for the armies of the European continent, Great Britain and the United States have depended upon voluntary enlistments and have resorted to conscription only as a last resort, as an extreme war measure.

THE COLONISTS.

The colonists in America became necessarily fighting men almost to a man. They could not afford to employ a guard of sufficient strength to protect them from the savages, so they had

to be prepared to protect themselves, and every community had its little military organization of which every able-bodied man was a member. At length each colony took general charge and supervision of the military organizations within its borders, but still left them quite free in their organization, training and even their employment when called out for service.

During the various wars waged by Great Britain on the Continent of Europe in the eighteenth century the British colonies on this side of the water were engaged against the French colonies and their Indian allies. The colonies maintained no standing armies, but volunteers were enlisted from time to time as occasion required and were discharged when their services in the field were no longer needed.

This was a simple matter then when nearly every man was more or less a soldier and when calls for service were so frequent as to keep them in training. In important and distant expeditions they usually served in conjunction with British Regulars and under British generals.

THE REVOLUTION.

When the Revolution broke out, therefore, the colonists were more or less familiar with small military movements, military organization and discipline. At first the colonies raised troops by calling out the colonial militia, but soon afterwards under the authority of the Continental Congress, and later under the confederation, volunteers were enlisted under the general government. Washington had no confidence in the militia and urged that all the troops raised should be volunteers enlisted into the Continental Army.

The people of the United States have never been more intensely patriotic than in those long years of the Revolution. In no other way can the Revolutionary soldiers' continued service, without pay, half clothed and half fed, be explained. Under guidance of the great mind of Washington and led by him through years of despondency, discontent, disgust and almost despair, they were still held together in faithful service by their loyal devotion to the cause of Liberty and Union.

WAR OF 1812.

On June 18, 1812, the United States declared war against

Great Britain. The Regular Army consisted of about 6000 men. Congress immediately authorized its increase to 25,000, the acceptance of 50,000 volunteers and authorized the President to call out 100,000 militia. But the war was unpopular in a large part of the country and was bitterly opposed in New England. The ranks of the Regular Army could not be filled even by the offer of large bounties and it was almost impossible to secure any volunteers. Recourse was then had to the militia and requisitions were made on the States for their quotas. But some of the governors declared that the President had no authority to order the militia out of the particular State to which it belonged and that in any case he could not call it into the service of the United States except on the existence of one of the conditions expressly mentioned in the Constitution, viz.: "to execute the laws of the Union, suppress insurrection, and repel invasions," and of the actual existence of the condition each State was itself to be the judge. It was about thirty years since the close of active fighting in the Revolution and therefore those who had fought in that war were most of them too old for this. The generals appointed were for the most part either old and unfitted physically and mentally for the conduct of active operations, or else were political appointees without experience save in the militia, which, except on the Indian frontiers, was very inferior. Such was the condition of affairs not only at the beginning but almost to the close of that three years' war. Many of the men who did go to the war were obtained in the Middle and Southern States through the personal efforts of such popular leaders as William Henry Harrison and Andrew Jackson. Even the capture and destruction of the National Capitol failed to call forth from Congress measures adequate for national defense, but roused the States to raise armies of their own for local defense. A part of these forces were afterwards mustered into the United States service for short periods.

It has been charged, with apparent justice, that the Administration itself was incompetent to conduct the war. It is difficult to obtain volunteers in times of defeat and disaster unless there is some great principle to be fought for and unbounded faith in the government under whose banners they are asked to

serve. In this war neither of these conditions obtained and there were open threats of secession and disunion. It is therefore not surprising that men were not anxious to enlist and that in the annals of the land operations there was an almost unbroken series of failures in planned campaigns, disgraceful exhibitions of cowardice and mutiny by the militia and other raw troops, even in the face of the enemy, and a general demoralization sickening to contemplate. The Navy, fortunately, a national force, free from State bickerings, and free from political commanders aboard ship, fought with a spirit worthy of Revolutionary days, and achieved a measure of glory that is an inspiration to it even to this day. Our final successes in western Canada and in northern New York were due to the naval victories of Perry on Lake Erie and MacDonough on Lake Champlain.

The principal object of almost every campaign and the main effort of the war itself was directed to the conquest of Canada. That was a signal failure and at last we were ourselves thrown on the defensive along the frontier, the sea-coasts were devastated, our Capitol itself captured and burned, the President, Cabinet and Congress fugitives before the enemy.

The trouble in 1812 was that the Government went into the war without preparation. In the hurly-burly of preparing everything at once things were done at haphazard. Politics had to be considered in every appointment, every movement. At last, owing to the opposition of some of the States, the general government was nearly paralyzed. The same thing is liable to happen again unless the Government has at least a well-defined, practicable system of national defense matured in peace and all ready for use in war.

MEXICAN WAR.

The Mexican War, like the War of 1812, was unpopular in New England and in fact all through the North as it was looked upon as a war for the extension of the slave power. War was declared May 13, 1846. The Regular Army consisted at that time of about 5000 men, 3600 of whom were in Texas, which had, a few months previously, been annexed to the United States. A few days before the declaration of war, however,

General Zachary Taylor, commanding the United States troops in Texas, had fought and won two battles against Mexican forces. 50,000 volunteers were called for. Many times this number were offered, mostly from the Southern States, where, very naturally, the war was popular. Then, too, the troops were going in under officers and with regular troops who had already won two splendid victories over superior numbers.

From spring to autumn after the declaration of war the volunteer regiments and the recruits for the Regular Army were enlisted, moved forward and drilled with the regular troops in the field, so that by September the entire army was well prepared to go on with the campaign.

The war was most gallantly and successfully fought against overwhelming numbers and well-nigh impregnable positions by Regulars and volunteers, no call being made upon the militia.

There were, all told, only about 116,000 men enlisted in that war, over one-fourth of whom were Regulars.

THE CIVIL WAR.

The Confederates fired on Fort Sumter the first shot of the war on April 12, 1861. The fort was surrendered on the 13th. On the 15th the President of the United States issued a call for 75,000 militia.¹ The same date a circular from the War Department was sent to the governors of all the States, except California and Oregon (which were so far away as not to be included in the call) and the States that had already joined the Southern Confederacy. The circular explained that the call was for regiments of infantry only, of 780 men each, and gave the number of regiments apportioned to each State. Ninety-four regiments were thus called for. The Southern and border States flatly refused to comply with the requisition, but in the Northern States the response was most hearty and many times the number called for were offered. But it must not be supposed that the men or even organizations that offered so patriotically to go instantly to the front were properly armed, drilled and disciplined soldiers. Only a few of the best regiments would compare favorably with the organized militia of to-day.

At the time Sumter was fired upon the North had done nothing to prepare for war, although the issues on which the war

was fought had been bitterly discussed for years, and although for several months the overt acts of many States in the South had been such as to make war inevitable if the Union was to be maintained. But many newspapers of the North, especially those in the business centres, were willing to yield to almost any demands of the South rather than go to war. "Why paralyze business, turn thousands of the industrious poor out of employment, sunder the last ties of affection that can bind these States together, destroy our once prosperous and happy nation, and perhaps send multitudes to premature graves—and all for what?" said the *New York Journal of Commerce*.

The Government pursued a "peace" policy from the fear that acts of preparation would be construed as acts of hostility. It was feared that any act looking to the use of force would precipitate war, and hoped that a contrary policy would preserve peace. In this the Government was doubtless right. The time of preparation is before the occasion or probability of war arises.

Let us see just what were the conditions in the North at the time of the first call for troops and how the war preparations progressed.

In the first place we must observe that, however indifferent, incredulous, or even obstructive may have been the peace party—Democrats and conservative Republicans—the actual firing on the flag of the Union consolidated all parties into one whose only creed was "The Union *shall* be preserved." It became a personal question with each one. The first angry blow had been struck. The North must basely submit or return the blow: must play the coward or the man.

As far as calling out patriotism is concerned the Civil War did it as effectually as any war we have ever had or are likely to have. It may therefore be taken as the most favorable example of what may be expected in the way of voluntary military effort in the United States.

The North had a population of about twenty-one and one-half million whites, the South only about five and one-half millions. The North had the advantage also in material resources of every kind: agricultural, mechanical, financial, marine, etc. In the South the patriotism was stronger perhaps than in the

North and the men were undoubtedly better prepared for war the first two years, for the reason among others that they were better officered. This fact is almost universally given by historians as one of the most potent reasons why the Confederacy was so successful at the beginning of the war. Over two hundred officers of the Regular Army resigned and went into the Southern armies before and at the beginning of the war. There were also many in civil life who had been officers in the Mexican War. These were appointed where they could have the largest commands, teach the largest number of men and conduct all the important operations. President Davis was himself a graduate of West Point, was in the Mexican War, had been Secretary of War and knew personally most of the educated officers who went into the Southern armies.

President Lincoln, on the other hand, knew nothing of military affairs and had a very slight acquaintance with officers of the army. General Scott, the head of the army, was about seventy-five years old—a grand old hero, but too infirm in body and mind to properly take up the conduct of another war.

The experience of the volunteers in the Mexican War, which had ended only about fourteen years before the Civil War opened, inured mostly to the advantage of the Southern cause, as nearly all the volunteers had been drawn from that section. The same to a less extent may be said of the War of 1812. So that practically the people of the North had had no war experience to speak of since the Revolution—about eighty years before.

Militia laws were on the statute books, but nobody paid any attention to them—any more than we do now. There were in every State bodies of volunteer militia, but the efficiency of the bodies differed as much as might be expected from so many different armies each under a separate jurisdiction and not subject to any common direction. Some of it was well disciplined, drilled, uniformed and armed; but most of it was badly disciplined, poorly drilled, unsuitably uniformed and with antiquated arms or none at all. Very few regiments had camp equipage or field cooking outfits.

After the fall of Sumter there was great fear of an attack on Washington and all the militia that responded in the East

was headed directly for the Capitol. The proclamation was issued April 15th. Pennsylvania being the nearest loyal State, militia from that State was the first to arrive, a few companies coming in the next day after the proclamation and others following on the 18th. The 6th Massachusetts regiment reached Washington on the evening of the 19th—the first full regiment to arrive. The railroad route through Baltimore was then closed. The 8th Massachusetts started on the 18th and the 7th New York on the 19th, both going around by Annapolis and reaching Washington on the 25th. At the same time the Rhode Island regiment, the 71st New York and some others also reached the Capitol. Railroad communication through Baltimore was opened May 9th and from that time on troops continued to pour into Washington. These volunteer militia were mustered into the service of the United States for three months only—some, by special arrangement for a still less time.

On May 3d the President called for 42,000 men to serve for three years or the war. This was followed by other calls asking for an aggregate of 500,000 men, within the space of three months. These calls were responded to with alacrity and the whole North became a recruiting camp. As fast as regiments were organized mustering officers of the Regular Army were sent to muster them into the service of the United States and they were sent to the front.

Major Irvin McDowell of the Adjutant-General's Department, was placed in immediate command of the troops arriving in Washington, but no brigades were formed and no systematic drill required until about the first of July. What drilling was done was mostly squad and company drill. Each regiment drilled about as much or as little as it saw fit. All company and regimental officers were appointed by the States from which the militia and volunteers came. General de Trobriand says: "The officers were nearly all incompetent. A regiment which had had any practice in firing was an exception, as was a colonel knowing how to command." General Grant, speaking of the Illinois regiment to which he had just been appointed colonel in place of the militia colonel who had been elected with the prospect of thirty days service only, says: "There were also men in it who could be led astray; and the colonel, elected by

the votes of the regiment, had proved to be fully capable of developing all there was in his men of recklessness. It was said that he even went so far at times as to take the guard from their posts and go with them to the village near-by and make a night of it. When there came a prospect of battle the regiment wanted some one else to lead them. I found it very hard work for a few days to bring all the men into anything like subordination; but the great majority favored discipline, and by the application of a little regular army punishment all were reduced to as good discipline as one could ask." "I remained in Springfield with my regiment until the 3d of July [about a month]. By that time the regiment was in a good state of discipline and the officers and men were well up in the company drill."

A little over three months after the call for 75,000 militia, and nearly three months after the first call for volunteers for the war, an advance of about twenty-five miles was made into Virginia and the battle of the First Bull Run was fought, with some 30,000 men on a side. The battle, though well begun, resulted in a general stampede of the Union troops, about the only ones not stampeded being a small body of Regulars.

This was the end of the first chapter. After three months of the most intense activity through the whole North on the part of both Federal and State authorities an active army of only thirty to thirty-five thousand men had been gotten together for marching "on to Richmond" and capturing the Confederate capitol. Other troops there were in smaller numbers, in the West and in recruiting depots and some even in Washington. But the largest army that could be gotten together for what was intended to be a decisive action consisted of not more than 35,000 men, part of whom were militia and part three-year volunteers.

The day after the battle of Bull Run, George B. McClellan was placed in command at Washington. He had graduated from West Point, fought in the Mexican War, visited Europe during the Crimean War and made a lengthy report on foreign armies. Shortly after that he resigned to become President of a railroad at a salary of \$10,000 a year with his office in Cincinnati. On the outbreak of war he was made a Major-General of Ohio militia and on May 14th, Major-General, United States

Army. Assigned to command in Western Virginia he had already been successful in the field in several small actions. He was still a young man—only thirty-five.

Whatever opinion people may hold with regard to General McClellan's ability in the field as a fighting general, it is generally conceded that he was one of the most efficient organizers that the war brought forward.

The condition of affairs in Washington after the battle of Bull Run was one of general panic. It was necessary first of all to place the city in a posture of defense and restore confidence. General McClellan immediately set about this task. He ordered all officers and men to join their own commands. "There were about 1000 Regular infantry under McDowell at Arlington. These with a Regular battery and a squadron of Regular cavalry I at once brought to the city and employed as a provost guard, with most satisfactory results."—McCLELLAN'S "Memoirs." He sent those volunteers who had been in the last campaign into camp on the Virginia side of the Potomac, and as new troops came in they were formed into provisional brigades until drilled, and disciplined for a few weeks when they were sent across the river. A chain of fortifications was begun for the defense of Washington. So the rest of the summer, the autumn and the winter passed away in raising, mobilizing, organizing, drilling and disciplining the volunteers.

In the autumn the public began again to vehemently urge another forward move into Virginia. It was now some six months since the first call for volunteers and some three months since the battle of Bull Run. General McClellan thought the army was not, either in efficiency or in point of numbers, in a fit condition to undertake any movements on a grand scale.

A great deal has been said on this subject by those who know nothing of military affairs and by those who know a great deal. One of the most eminent and impartial military critics in America to-day, Mr. John C. Ropes, states the case as follows :

"The army was not ready, in the autumn of 1861, to commence an active campaign. For the hard tasks, the rude experiences, the frequent disappointments, the severe fighting of aggressive warfare, the men were not then sufficiently discip-

lined. The army was not at that time welded into a compact and vigorous organism. The demand of the public evidently sprang from an essentially erroneous notion of the nature and conditions of civilized warfare. A trial of strength between two armies rarely takes place until the endurance, fortitude, patience, and obedience of the men have been put to almost every conceivable test; it is in these preliminary experiences that the priceless value of discipline, of real soldierly feeling, of military habits, is shown; and it is this which the non-military public does not know, and is always most unwilling to learn."

On October 15th McClellan had in and around Washington a grand total of 152,000 men, not more than 41,000 of whom were available for the active army, after detailing the troops necessary for guarding the approaches to Washington and Baltimore, deducting 12,000 who were still without arms and equipments, and those absent, sick and on extra duty.

"It is not too much to say that it would be wise to exclude from the list of available regiments all those who had not been at least three months in camp. No less a period than this will suffice to get raw troops into a reasonably good state of discipline, to imbue them with military standards of duty, and to give them the priceless advantages of formed habits of soldierly conduct."

"On the first of March, on the other hand, all the troops had been two months in camp, and nearly all had been three months. The whole army was then in admirable condition, well taught, well disciplined, a compact, vigorous and very formidable force, and ready to take the field."—ROPES.

The first year of the war was, in fact, a war school for the forces on both sides. After that there were plenty of drill masters, and volunteers were drilled into shape in as many weeks as it had taken months before. "Official reports show that after the disasters on the Peninsula in 1862, over 80,000 troops were enlisted, organized, armed, equipped and sent into the field in less than a month. Sixty thousand troops have repeatedly gone to the field within four weeks. Ninety thousand infantry were sent to the armies from the five States of Ohio, Indiana, Illinois, Iowa, and Wisconsin within twenty days."—Report of Secretary of War, 1865.

It must be borne in mind always in speaking of the Civil War that the North was fighting an enemy who had no regular army and who was, after the first few months, no better prepared than herself and relying to the same extent upon raw troops. If time was necessary to raise and prepare Union troops for active operations, the same was true of the Confederates.

Speaking of conditions just after Bull Run McClellan said: "Perhaps even then a few thousand Regulars would have decided the war. But we had them not."

What had become of the Regular Army? It consisted at the outbreak of war of less than a thousand officers and only about 15,000 men. These were scattered all over the country, most of them on the Indian frontiers. By resignations, assignments to detached service, commissioned in the volunteers, etc., about half the officers were soon gone. Volunteers were given so much better terms as regarded pay (many States paid their men a certain amount in addition to their regular pay from the United States) period of enlistment, etc., that it was difficult and finally became almost impossible to get any Regular recruits. For an army of thirty regiments it was impossible to raise the aggregate above about 25,000 at any time during the war. It was very common for two or three companies to be thrown together to make a single company of respectable size. The small number in the Regular Army was almost swallowed up and lost sight of in the mighty host of volunteer troops. The war was fought by volunteers.

OFFICERS.

The crying want in the North at the outbreak of the Civil War was for instructed and competent officers. Of men, excellent material for soldiers, there were more than enough. But who could teach them even the manual of arms, and the simplest movements in company drill? Who knew how to make out a morning report, muster roll, or any other official paper? The fact is that many men were made officers for no other reason than that they did know these things—men without the education or character that officers should have. On the other hand many men were made officers for no other reason than that they were men of education, character, influence—men without the slightest knowledge of military affairs. The latter made

good officers in time, but in the critical period of organization and instruction they were verily "blind leading the blind." Many of the officers, however, came from the militia organizations then in existence and who therefore had a little knowledge of drill at least. Some were drawn from the militia while it was at the front under the three months' call. The 7th New York regiment, which was at Washington only about six weeks before returning to New York to be mustered out, had already lost 77 men who had been made officers in the volunteers and Regular Army, and in a few months this number was increased to 300. It was the same in a less degree, with many other regiments. But the volunteer militia of that time was not as a rule well organized or efficient, was not much encouraged by the States and was wholly neglected by the general government. So that it had been a social sort of an affair accompanied with very little discipline and no military experience outside of their drill halls, except on holiday parades—not a very good school for officers whose duty it would be to train men for the terrible realities of actual war.

Then, too, many officers were appointed on account of their influence in raising troops. A man would raise a company with the understanding that he was to be the captain of it; or a regiment, taking the colonelcy himself—and all without regard to any qualifications as an officer outside of his popularity with the men. Only forty-eight colonels of volunteers were appointed from the Regular Army in 1861; a few graduates from West Point and other Regular Army officers who had resigned and were in civil life also obtained colonelcies; but it must be remembered that there were 560 regiments of volunteers the first year of the war.² It is therefore seen that only a very small percentage of the regiments were under command of professional soldiers.

When it is considered how rapid promotion is in war and that a colonel of a few months' service is very liable to be called upon at any time to command a brigade it certainly seems little short of criminal to put a raw recruit in such a position.

Now it seems to the writer that the gist of the trouble was right here—the lack of capable officers of volunteers at the outbreak of the war, and that the key to the solution of the prob-

lem before us is to provide in time of peace a number of capable officers of volunteers sufficiently large to raise and train all the volunteers we shall need at the first call.

We must always remember that at the last the man that holds the gun is the man who fights battles. All that precedes is preparation.

“For the colonel rides before,
The major’s on the flank,
The captains and the adjutants
Are in the foremost rank.
But when it’s ‘Action front!’
And fighting’s to be done,
Come one, come all, you stand or fall,
By the man that holds the gun.”

—A. CONAN DOYLE.

The regiment is formed for action. It moves into position. The firing line deploys and advances. The officers retire behind the line. The fate of the battle now rests upon the “man that holds the gun.” The supreme moment of life or death to which all his training and instruction have been directed has come. We shall now see if the man in the firing line has learned his lesson; we shall see if the officer behind the line has done and is doing his duty.

“In every man—even the fool—there are latent stupendous possibilities. The latent powers of man of resistance and endurance are enormous. The battle-field is the place, the immediate superiors (the company officers) are the persons to bring this out.”—“Psychology of the Battle-field.” HERBERT.

Unfortunately, it seems to be the general idea of most of our people that any man with a gun in his hand is a soldier. They do not realize that in order to make a soldier of him he must be taken in hand by competent officers; he must be taught to use his weapons, to act in concert with his comrades, to take care of himself in the field, to yield his own will and judgment to his superior officers and obey promptly and intelligently all orders they give him. All this takes time, but with plenty of properly instructed officers it is surprising how little time is required. The new cadets report at West Point in June as raw as it is possible for men to be, and inside of two months the casual observer

can see no difference in appearance between them and cadets of the preceding class.

"Here let me say then that, given good officers, there are no men in the world who admit of a more thorough and effective discipline than the native born American of the North."—McCLELLAN.

Speaking of the Mexican War, General Grant says: "Victories in Mexico were, in every instance, over vastly superior numbers. There were two reasons for this. Both General Scott and General Taylor had armies such as are not often got together. At the battles of Palo Alto and Resaca-de-la-Palma General Taylor had a small army, but it was composed exclusively of Regular troops, under the best of drill and discipline. Every officer, from the highest to the lowest, was educated to his profession, not at West Point necessarily, but in the camp, in garrison, and many of them in Indian wars. The rank and file were probably inferior, as material out of which to make an army, to the volunteers that participated in all the later battles of the war; but they were brave men, and their drill and discipline brought out all there was in them. A better army, man for man, probably never faced an enemy than the one commanded by General Taylor in the first two engagements of the Mexican War. The volunteers who followed were of better material, but without drill or discipline at the start. They were associated with so many disciplined men and professionally educated officers, that when they went into engagements it was with a confidence they would not have felt otherwise. They became soldiers themselves almost at once. All these conditions we would enjoy again in case of war."

Speaking of Chapultepec and Molino del Rey, General Grant says: "The Mexicans, as on many other occasions, stood up as well as any troops ever did. The trouble seemed to be the lack of experience among the officers, which led them after a certain time to simply quit without being particularly whipped, but because they had fought enough."

This country never has and probably never will train the rank and file in times of peace in sufficient numbers to form an army or even the nucleus of an army on a war footing. The next best thing is to have officers trained and organized ready

to raise, drill and put into fighting shape, in the shortest possible time, the volunteers upon whom we must depend for the bulk of our armies in our future as in our past wars. We have never yet done even this much. But our costly experiences in the Wars of 1812 and 1861 should teach even those unacquainted with military affairs that delays in training and mobilization and at length disaster are sure to follow a reliance upon uninstructed officers, no matter how patriotic and loyal they and their men may be.

Much as it might be desired, therefore, we may as well abandon, at the outset, all idea of having any considerable body of volunteers under training at the outbreak of a war. Now, if the number to be instructed is to be small, evidently those instructed should be men of character and capacity to be the officers.

Let us assume then that, in time of peace, our preparative effort for the volunteers to be raised for war shall be confined to those who are to be officers.

Let us first direct our inquiries to how many officers will be required, and then to the sources from which these officers are to be obtained.

NUMBER OF TROOPS AVAILABLE AT A MOMENT'S NOTICE.

The Regular Army can readily be expanded to twice its peace footing without any increase in the number of officers, making a total Regular force on the basis of its present strength, of 50,000 men.

The organized militia numbers at present about 106,000 men and 9000 officers. It might turn out for a short term of service—say three months or less—about 100,000 strong. It is an emergency force and forms, with the Regular Army, the first line of defense, as it did in the Civil War, enabling the Union to make some show of military strength while raising its real war force—the volunteers. Many States have adopted the name "National" guard for the State troops, but the name "National" is a misnomer, as they are State troops in every essential respect, and come under national control only partially, temporarily, and in certain cases particularly specified in the Constitution. Their normal status is that of a State force, their

extraordinary and very exceptional use that of a national force. The United States Army is the National guard, the organized militia the State guard. However, it is with a laudable purpose probably, that the militia have taken the name "National." It is a much higher sounding title and expresses an aspiration to be something more than simple militia or State guards. The danger is that many people may imagine that the so-called "National" guard is in fact what it is in name only, and that we might depend upon it to carry on a war. Our past experiences, however, show that we can not do so.

The militia is first of all a State force and while 100,000 or more might be placed under arms on short notice in an emergency, a large proportion would have to be retained for local defense. Suppose for instance any foreign war, all the States on the exposed frontiers would have to retain their militia, so that it is only the militia in the interior that could be called upon to form a movable army. For a war with any power except Great Britain we should therefore have, counting general staff and all, an aggregate of about 44,000.³ In a war with Great Britain we should have to retain for local defense the militia of the States on the northern frontier, about 26,000.⁴ Making this deduction from the foregoing, we have a militia force of only about 18,000. Add to the former say 16,000 Regulars, and to the latter 12,000 and we would have 60,000 men in one case and 30,000 in the other to form an active, movable force. The foregoing, taking all things into consideration, is believed to be a liberal estimate.

NUMBER OF TROOPS REQUIRED TO DEFEND OUR FRONTIERS.

Owing to the great length of our frontiers and the uncertainty as to where and in what strength an enemy may strike, it will be necessary to have several armies of observation ready to move promptly to any point attacked in force. It is possible to transport across the ocean at one time an army of 50,000 to 60,000 men with their horses, ammunition, etc. Therefore the armies made up of the available militia and Regular Army will never be large enough to carry on a defensive war against any power likely to go to war with us. It is to be hoped that we shall never have a domestic disturbance that the Regular Army

and militia will not be able to handle, but if we should have one of great extent it is probable that about all the militia would have to be held to quell possible outbreaks in their own States.

In any case, therefore, of a serious war we should have to rely upon volunteers. But how many?

Of all the powers with which there is a possibility of our going to war Great Britain is the most formidable on account of her sea power, her naval and military stations in close proximity to our coasts, and her means of access across her own territory to our entire northern frontier. We should in fact have to fight both Canada and Great Britain. It is not possible to figure beforehand with accuracy how many troops would be needed in any case, but as Canada has no regular army and her organized militia is but 35,000 strong, it would seem safe to rely on about 100,000 more men to defend ourselves against Great Britain than against any other power.

It will require about 85,000 heavy artillery soldiers to man the fortifications of our principal harbors in time of war.

Suppose, however, an army of 50,000 to 60,000 Regular troops to have made a landing under cover of its fleet in an unfortified harbor. We should require an army of at least 100,000 volunteers to prevent their advance and certainly 200,000 to dislodge them before they could be reinforced.

So, without going into further calculations, it would seem that we should need about

85,000⁵ volunteers for fortifications.

75,000 volunteers for army of observation for North Atlantic Coast.

75,000 volunteers for army of observation for Middle Atlantic Coast.

75,000 volunteers for army of observation for South Atlantic Coast.

75,000 volunteers for army of observation for Gulf Coast.

75,000 volunteers for army of observation for Pacific Coast.

460,000 Total.

It is believed that at least this number would be required in the case of any war in which we might be engaged. Such an army would require between 20,000 and 25,000 officers.

NATURE OF DUTIES TO BE PERFORMED BY VARIOUS BRANCHES OF SERVICE.

Let us now take a glance at the nature of the duties required of the various branches of the service, in order to see whether or

not those duties can be picked up in a few weeks or whether a course of systematic instruction is necessary.

HEAVY ARTILLERY.

If our principal harbors were fortified and manned so as to prevent the entrance of an enemy's fleet the danger of a landing being effected would be greatly reduced and the enemy's task in landing and maintaining himself at any other point would be made more difficult. The outer line of land defense consists of the fortifications of our harbors, and our first attention must therefore be given to the needs of the heavy artillery on the outbreak of war. The most scientific work of the line of the army is in conducting the defense of a fortified seaport. While there is a great deal of work to be done in manœuvring heavy guns, handling ammunition, and so forth, that requires no very lengthy training and no scientific knowledge whatever, it still is true that a considerable proportion of the heavy artillery forces must have both a scientific and practical knowledge of artillery and torpedo practice. Any one at all acquainted with the complicated and costly engine constituting a modern heavy gun and carriage, the devices for loading and manipulating the piece, and, above all, the system for determining the range and position of a distant moving vessel (which, perhaps, can not be seen from the gun to be fired), predicting where the vessel will be at the end of a stated interval of time and transmitting such intelligence to the officer in charge of the gun, will see that the officers, at least for this service, must be given a long and systematic theoretical and practical instruction in the objects and operations of coast defense, in order to secure its effective service. The art of harbor defense as it must be conducted at present is in truth a new art. It has never been tried in war and there is only the experience of drill to go by. The efficiency of the system now being industriously and scientifically developed theoretically and, so far as possible in peace, practically, by the artillery service, depends not only upon the accuracy but the rapidity with which everything connected with the aiming and firing is done. To acquire accuracy and rapidity in any art much practice is necessary.

There has been talk at times about getting up heavyartil-

lery militia regiments in some of our cities, and in a few instances militia infantry regiments or parts of regiments have spent the time allotted for their encampment in drilling with heavy guns in some of our fortifications. Last year a regiment of Massachusetts militia infantry drilled for a week at Fort Warren, and this year we understand a regiment of militia heavy artillery is being formed in Boston harbor. But the heavy artillery service is not of a nature to be popular with the militia. It is all work and no play. No crowds of admiring spectators, no parades, reviews, "Governor's day," etc. Besides that, it is hardly the business of State troops to man United States forts. The principal object for which the State forces are kept up is to give the State a military force under its own control for the purpose of enforcing State laws and preserving the peace within its borders. Heavy artillery militia would be of no use for these purposes, because they would not have time to learn infantry drill. It can hardly be expected that States as such will take much interest or expend much money in maintaining a force that does not fulfil the primary object for which State forces are maintained. The Constitution makes it the express duty of the general government "to provide for the common defense."

It is not believed, therefore, that the Government can ever place much dependence upon State help in time of peace toward providing a force to man our fortifications. The general government should therefore undertake to provide some means by which an adequate force to man our coast defenses can be quickly provided in case of war. How shall this be done? How, for instance, shall a great body of officers requiring years of theoretical study and practical work be provided without inordinate expense?

MOUNTED SERVICE.

Take the mounted service—cavalry and light artillery. This service is very expensive to provide and maintain, and no State, not needing it for its own purposes, is willing to spend enough money to do it properly. There are, to be sure, a few militia cavalry troops that are very efficient indeed, but they are maintained in great part by the individual members of the troops. More time is required to make an efficient cavalryman

or light artillery man than to make an efficient infantryman, for the reason that he has to learn as much as the infantryman and a great deal more in addition. The artillery is put into action earlier and with greater celerity than in former times. The cavalry is used for two distinct purposes—one quite as important as the other. In the first place, cavalry patrols the country for many miles in the front and on the flanks of an army, making reconnaissances, maps and reports of everything seen. In the second place, it takes its position in the line of battle and fights as of old. How shall the mounted service be raised and prepared for its multifarious and important duties in a few short weeks?

INFANTRY.

Take the infantry. In these days of magazine rifles and of extended lines of battle the infantryman no longer marches to meet the enemy "elbow to elbow" with his fellows. He has not the moral support which close proximity to his comrades gives. He must look out for himself and at the same time respond instantly to the signals of his chief of squad or section. The distances he must march over are longer and more fatiguing; the fire he must face at close range more deadly. Accurate drills and rigid discipline continued for a reasonable length of time are the only things that can make an efficient body of modern infantry. Who are to be these accomplished drill-masters and disciplinarians ready to hand at the outbreak of war?

TIME REQUIRED FOR PREPARATION.

Before attempting to answer the foregoing questions let us see what is a reasonable time for the preparation of raw levies for a campaign.

Washington took command of the colonial militia at Boston July 4, 1775. He had upwards of 20,000 militia until about January, 1776, when recruiting began for the Continental Line under a term of service of only one year. Earthworks were thrown up, but no move made looking to a clash of arms until February. The evacuation of Boston occurred in March, without a battle having been fought. In August, 1776, there were in the Continental Line only about 9000 men. The battle of Long Island, in August, resulted in the retreat of the Americans from

one position to another in the face of superior forces until the end of the year. It was therefore over a year from the time that Washington took command, and eight months from the first enlistments in the Continental Line, that the first battle was fought.

In the War of 1812 the most conspicuous example of regular training to fit volunteers for fighting was that of Scott's brigade before the battles of Chippewa and Lundy's Lane. Scott, who was then only 28 years old, had just been made a brigadier general. He joined the troops about the middle of March. There were in his brigade three small regiments of infantry. "He began by forming the officers of all grades indiscriminately into squads and personally instructed them in the school of the soldier and company. They then were allowed to instruct squads and companies of their own men—a whole field of them under the eye of the general at once, who, in passing, took successively many companies in hand, each for a time. So, too, on the formation of battalions; he instructed each an hour or two a day for many days, and afterwards carefully superintended their instruction by the respective field officers. There was not an old field officer in the two brigades of infantry." "The brigadier general's duties were about the same in respect to lessons other than tactics (measures of safety to a camp, near the enemy, police, etiquette, etc.)" "The evolutions of the line, or the harmonious movements of many battalions in one or more lines, with a reserve, on the same principle that many companies are manœuvred in the same battalion, and with the same ease and exactness, were next daily exhibited for the first time by an American army, and to the great delight of the troops themselves, who now began to perceive why they had been made to fag so long at the drill of the soldier, the company and the battalion. Confidence, the dawn of victory, inspired the whole line."—SCOTT. Chippewa was the first battle in which this brigade was engaged. That was on the 5th of July, a little over three months from the time that General Scott took command. About three weeks afterwards the desperate night battle of Lundy's Lane was fought. In both actions Scott's brigade covered itself with glory.

In the Mexican War the battles of Palo Alto and Resaca de

la Palma were fought early in May, and the President called for 50,000 volunteers the 13th of May. At the beginning of the war there were only 635 officers and 5925 men in the army—15 regiments. This Regular force was increased by the addition of ten new regiments and filling up those already in service.

The volunteers and recruits began joining immediately after being called for, but it was not until late in September that Taylor made any forward move. The battles of Monterey, September 20th to 24th, were the first fought by his new army—over four months after recruits and volunteers began to be enlisted. Scott did not reach Vera Cruz to begin his campaign until the 7th of March—nearly ten months after the army increase was begun.

In the Civil War, the President's proclamation was published April 15th. The militia began to arrive next day. The regiments were not put into brigades until about the first of July. Some of the militia regiments had gone home, and some of the three years' volunteers had arrived only a few days before the first battle, Bull Run, July 21. The utter rout of the Union forces in which that battle resulted caused an immediate change of commanders. McClellan had to make a fresh start, and it is from the time that he assumed command that the systematic instruction of our volunteers began. He did not begin his advance until the following spring, over seven months from the time he took command.

In the West there were some active movements in the autumn. Grant, who had been in the field since June, says: "By the first of November I had not fewer than 20,000 men, most of them under good drill and ready to meet any equal body of men who, like themselves, had not yet been in an engagement."

From the foregoing we see that in all our past experiences there has never been, at the beginning of a war, an efficient body of infantry prepared for the field in less than three months' time.

TIME REQUIRED BY FOREIGN NATION TO MAKE ATTACK.

In the next place it is necessary to consider in how short a time a foreign nation could make an attack upon us, as that would be the time in which we must prepare to meet the attack. Any one of the great powers has a navy much stronger than

ours, and a standing army ready for a campaign as soon as transports could be gotten ready for it. Allow fifteen to eighteen days for embarkation of troops and supplies. To cross the ocean would require, for a great fleet under convoy, twelve to fifteen days. A month, therefore, is believed to be about the shortest time in which a large army could reach our shores after war had been decided upon. Knowing our lack of preparation for war, a nation would make every effort to strike us as soon as possible after a determination once made to do so. It would seem then that a month would or might be the longest time allowed us. But that is a shorter time than we have ever been able to get raw troops even tolerably ready for a campaign at the beginning of a war. Any system that will enable us to do so now must therefore be materially different from any system that we have heretofore pursued. It is intolerable to think of permitting a devastation of our coasts such as occurred in 1812 while we are getting ready to defend ourselves. How can we prepare our forces to meet the enemy when he may first arrive—in one month's time?

The vital question before us then is not only how can our volunteers be raised and prepared for war, but how can they be raised and prepared for a defensive campaign in one month's time?

A great many people are in the habit of speaking of our small Regular Army as a "nucleus" around which the volunteers are to be formed, and which, by some quasi-leavening process, is to transform the whole mass in a short time into an army that shall be but little inferior to the Regular Army itself. But it has never worked that way except in the Mexican War, where the Regulars numbered about one-fourth of the entire force. In time of peace the army is kept on a peace footing, so that when war breaks out it becomes necessary to about double the number of men. To handle this number of recruits and bring them up to Regular Army standards of drill and discipline in a few weeks is a great task in itself. The plan of breaking up the Regular regiments and scattering officers and men among the volunteers has had its advocates, and the question of doing so was seriously broached at times early in the Civil War. General Grant himself thought this could

be done advantageously just for the sake of getting the Regular officers distributed among the volunteers. He commanded the district of Cairo during the winter of 1861-62, and had frequent opportunities of meeting the rebel officers of the Columbus garrison. He says: "There were several officers among them whom I had known before, both at West Point and in Mexico. Seeing these officers who had been educated for the profession of arms, both at school and in actual war, which is a far more efficient training, impressed me with the great advantage which the South had over the North at the beginning of the Rebellion. They had from thirty to forty per cent. of the educated soldiers of the nation. They had no standing army, and consequently these trained soldiers had to find employment with the troops from their own States. In this way what there was of military education and training was distributed throughout their whole army. The whole loaf was leavened.

"The North had a greater number of educated and trained soldiers, but the bulk of them were still in the army and were retained, generally with their old commands and rank, until the war had lasted many months. In the Army of the Potomac there was what was known as the 'Regular brigade' in which, from the commanding officer down to the youngest second lieutenant every one was educated to his profession. So, too, with many of the batteries; all the officers, generally four in number to each, were men educated to their profession. Some of these went into battle at the beginning under division commanders who were entirely without military training. This state of affairs gave me an idea which I expressed while at Cairo, that the Government ought to disband the Regular Army, with the exception of the staff corps, and notify the disbanded officers that they would receive no compensation while the war lasted except as volunteers. The register should be kept up, but the names of all officers who were not in the volunteer service at the close, should be stricken from it."

General McClellan, speaking of the army at Washington after Bull Run, said: "The great trouble is the want of officers. We have good material but no officers." "At this juncture it would have been wise to adopt a definite policy with regard to the Regular Army, viz.: either virtually break it up, as a tem-

porary measure, and distribute its members among the staff and regiments of the volunteer organization, thus giving the volunteers all possible benefit from the discipline and instruction of the Regulars, or to fill the Regular regiments to their full capacity, and employ them as a reserve at critical junctures. I could not secure the adoption of either plan, and a middle course was followed, which resulted less favorably than either of the plans indicated; but it must be said that, even as things were, the Regulars were in every way of immense benefit to the service. As a general rule the officers (and, of course the non-commissioned officers) of the volunteer regiments were entirely ignorant of their duties, and many were unfitted, from their education, moral character, or mental deficiencies, for ever acquiring the requisite efficiency."

There were in the Regular Army in December, 1860, 1108 officers and 5259 men. The organizations were the staff corps, five regiments of cavalry, four of artillery and ten of infantry. On the outbreak of war there were authorized one more regiment of cavalry, one more of artillery and nine more of infantry. To fully officer the new regiments required 803 officers. Add to the number of officers in the Regular Army in December 1860—1108—the number required for the new regiments and we have 1911. But before January 1st, 1862, 277 resigned, 6 were dropped, 30 were dismissed and 18 had died, 111 were on duty as officers of volunteers, and 23 as aides-de-camp—a total of 465. Take this number from 1108 and we have 643 officers remaining from the old establishment. Add the Military Academy graduates who entered the Union armies of May 6—37—and of June 24—31—(there were two graduating classes in 1861) and we have a total of 711 officers to fill 1911 offices—a little more than one-third enough.—Army Registers for 1861 and 1862.

The rest of the offices and those of the increase in the staff corps were filled by appointment of civilians, many of whom had had no military training whatever. It was for this reason, perhaps, that the War Department opposed the acceptance by Regular officers of commissions in the volunteers. General Sheridan says of his experience on receiving an appointment from the Governor of Michigan as colonel of a volunteer regi-

ment from that State: "I took the order to General Halleck, and said that I would like to accept, but he was not willing I should do so until the consent of the War Department could be obtained. I returned to my tent, much disappointed—for in those days for some unaccountable reason the War Department did not favor the appointment of Regular officers to volunteer regiments and I feared a disapproval at Washington." However, Captain Russell A. Alger—now Secretary of War—who had brought the appointment, urged him to see the general again, which he did and obtained his consent to leave. With characteristic energy he immediately turned over his quartermaster property to his successor and left for his regiment that very day.

Of the Regular officers appointed in the volunteers before the first of January, 1862, there were one major-general, 50 brigadier-generals, 48 colonels, 6 lieutenant-colonels, 6 majors. The 23 aides-de-camp were nearly all on duty with volunteers.

On the first of January, 1862, the volunteer organization showed 41 major-generals, 125 brigadier-generals, and 560 regiments. The number of officers of volunteers was 19,822; men, 556,252.—Army Register, 1862.

Truly, without any systematic assignment of officers and men the Regular Army would have been almost lost in such a large body. And there was no systematic assignment by the War Department. "Political generals" and educated officers were made and assigned to command indiscriminately. Brigade and division commanders were often made and assigned without even consulting the commander of the army to which they belonged. Of course it is understood that we are speaking especially of the first year of the war. Later, when Grant, Sherman, Sheridan, and the other great generals of the war were in a position to do so, they made the assignments for their armies, which were as a rule upheld, for the authorities at Washington at that time took a different view of military matters. They had, perhaps, learned that it is better to defer the conduct of military affairs to military men. The nation paid heavily for that lesson and for that first year's "school of war," but our people have been so dazzled by the victories of 1863 and 1864 as to see but dimly and almost with complacency the defeats

of 1861 and 1862. It is but natural that we should prefer to talk of our victories and keep silent over our defeats. The ultimate success of the war has interposed a screen between us and its terrible, inglorious beginning. But we ought sometimes to draw aside the veil, look at the facts as they were and see if we can not profit by our past experiences. One of the most striking features of the conduct of the war is that often the acts most to be condemned from a purely military standpoint are most to be commended from a political standpoint. The military student is disgusted, the political student delighted, but the impartial critic discerns that many, if not most, of the moves made by the Administration were dictated by the imperious necessity of the times and circumstances; that, however faulty they were from a military standpoint, they were apparently necessary to popularize the war and obtain volunteers and money to continue the conflict to a successful issue. It is our task to invent and develop a system of raising and handling our volunteers that shall eliminate, so far as possible, political expedients from military measures, and that shall, in fine, prevent the recurrence of such a condition of affairs as prevailed in the Civil War, and the War of 1812.

SYSTEM FOR RAISING VOLUNTEERS.

From the foregoing we believe that the only way in which our volunteers can be raised and tolerably prepared for a defensive campaign in from four to six weeks' time is to have a volunteer system all ready worked out in peace so that the skeleton regiments will be all ready named, located, and fully officered by capable officers, ready to be filled with men at a signal from Congress or the President of the United States.

The following system, it is believed, fulfills the above requirements at a reasonable expense, and is perfectly practicable—not in any way discordant with respect to our general system of government, or the theory of our republican institutions. According to that theory, all men, no matter what their wealth, profession, or status in society, have equal interest in the management and maintenance of the state, and are equally bound to render personal service to the state when so required. The number required from any district for personal service to the

state is therefore determined by the population of the district. Now the only arrangement of the population of the United States in groups of about equal numbers is the division into Congressional districts. There are at present (1897) 357 of these districts, 3 territories (excluding Alaska, and Indian Territory) and the District of Columbia. One regiment—12 companies of 100 men each—from each district would give 433,200 men—about the maximum number of volunteers we could expect to handle at the first call. Any less number per regiment could be obtained by calling for a less number of men per company or calling out only one or two battalions per regiment.

The officers for each regiment should be commissioned, trained and instructed in time of peace. The colonel of each regiment should be an officer of the Regular Army selected on account of his special fitness for the position. In our army since the war the cases have been rare in which a colonel has commanded his entire regiment at one post, so that we are liable to lose sight of the duties of a colonel who has his whole regiment in hand, as he would have in time of war. He is the head of the regimental family, the instructor of the regiment, and should be its model soldier. With our latest system of drill regulations, his regiment covers nearly as much ground and requires about as much skill to handle as did a brigade in the late war. By having the colonels all men who have been moulded in the same school insures an uniform degree of excellence in their regiments, a correct execution of drill movements, a correct interpretation of the duties devolving upon officers of the various grades, the proper discipline to be enforced, an adequate acquaintance with minor tactics, a practical knowledge of correct administrative methods, and some notion of the customs of the service. It will not do to have retired officers for this duty. The principal advantage to be derived from this system depends on having the officers of each regiment in time of peace the identical officers who are to raise their men, prepare them for the field and lead them to battle. The colonels should be officers of the active army not above the rank of major, and so far as possible, men who were originally from districts to which they are assigned to duty. In the performance of this duty in time of peace, it is not necessary that they be detached for more

than one month in each year. During this time they should have the local rank and pay of colonel of volunteers.

Officers on college duty and on duty with the militia, could readily take this work in addition, as the annual period of instruction for their regiments could be made to fall at such a time as not to interfere with their other duties. As to the other officers. The first year let an examination for position of lieutenant be held, of all applicants for commission in each district—the examination to be both physical and mental, theoretical and practical—its scope to be determined and directed by the War Department. Let the colonel be the examiner; the physical examiner, under the colonel's direction, being a surgeon of the district, commissioned on the colonel's recommendation, as surgeon of the regiment with relative rank of major.

Let the colonel recommend the twenty-six passing the highest examination (if so many as that pass a satisfactory examination) for commissions as lieutenants in his regiment. Let the commission and the corresponding oath of office be for five years. Candidates should have had some military experience either in the Regular Army, organized militia, military school or at a college having a Regular officer on duty. Let the officers commissioned be ordered to get their uniforms and appear at the designated place for a tour of duty of ten days. Here the colonel will take them in hand and give them all the instruction possible to fit them for efficient drill masters and company officers.

The second year let them hold two examinations, one of the lieutenants over 26 years of age for the position of captain and one of the new candidates to fill the vacancies among the lieutenants. The new candidates should be between 21 and 30. Let this be followed by a ten days' period of instruction as before. The third year let him hold three examinations: one for major, of captains over 31 years of age; one to fill vacancies among captains, of the lieutenants having seen two years service, and one of the new candidates to fill vacancies.

The fourth year let him select one of the majors over 36 years of age for lieutenant colonel. Thereafter the examining board to consist of the colonel, lieutenant-colonel and ranking major, with the regimental surgeon as physical examiner only. Let vacancies be filled by a competitive examination of at

least twice as many officers of the next lower grade as there are vacancies—officers being selected for examination according to rank. If a volunteer officer does not receive his promotion by the time his commission expires let him be mustered out, but if he has passed a satisfactory examination for the next higher grade let him receive the brevet rank of that grade. After the regiment has gone to the front and become actually engaged in war, vacancies occurring in the rank of colonel could be filled at the discretion of the President from the regiment itself, thus opening the way to the highest commands for those proving themselves, in the test of actual war, to be the best soldiers.

Let there be an annual drill of ten days' duration at such a time as not to interfere with militia encampments, so that officers who belong to both services may not be deprived of the instruction and experience to be derived from both. But a militiaman's conditions of service in the State forces must be expressly subject to the conditions of his oath and commission in the volunteers, so that if it should ever happen that he be called upon by both State and general government at the same time it could be distinctly understood by all that he must obey the call of the United States.

The colonel ought to be a man who will take right hold and give his men squad drill himself every year. It won't hurt any officer to drill down with the men, and these men who are to be drillmasters of squads can not be better prepared for their duties than by being put in a squad and drilled a few times, then in turn taking a squad as drill master, and so on to the higher commands. He should bring all his officers to be especially proficient in just what they would have to do as the first thing on recruiting their companies.

Let the theoretical work be done in the evenings and on rainy days. A course of study and reading should be laid out for the ensuing year to be discussed and gone over at the next year's training. Let a guard be mounted daily and the strictest discipline be maintained at all times. Let all be governed by the Articles of War and the Army Regulations as far as possible. Don't have any full dress formations. The time is short and must be crowded with work. The men should be in the field for their ten days' training, in camp. The four regiments

to form a brigade should be brought together as often as possible for a part of the ten days at least.

The officers of each regiment will form a small company; the four regiments of a brigade, a battalion, and the three brigades of a division a regiment. The entire division should be brought together at least once in five years. The officers of the regiment should be drilled for the most part as men in ranks—as cadets are—the field officers acting as company officers and guides.

The heavy artillery regiments should always be drilled in the nearest fort having modern ordnance and should be familiar with the waters and fortifications nearest their own districts. Volunteer heavy artillery should be taught no more about small-arms than is absolutely essential for them to know in doing guard duty or in an emergency. Their proper arms are artillery weapons only. They will have no time to learn the use of any others.

The regiments of heavy artillery should be from districts on the coast, those of the mounted service where good horses are plentiful (having due regard to the proportion of each arm within the territorial limits of one army corps).

The designation of each regiment should show the State, number of district, and arm of service, as 7th New Jersey, Heavy Artillery; 8th Kentucky, Cavalry; 29th New York, Infantry.

As to compensation, it should be sufficient to at least pay all legitimate expenses, say four dollars per day to all not mounted, and six dollars per day to all required to be mounted and actually properly mounted. All officers to pay for their own clothing and subsistence. Mounted officers to furnish their own horses and pay for their forage. Actual travelling expenses to and from the rendezvous to be paid by the Government; arms and equipments to be furnished by the Government.

Counting each colonel as receiving the same as other volunteer officers in addition to his pay in the army, the expenses for each year would foot up approximately as follows, for ten days:

In each regiment, 1 colonel, 1 lieutenant-colonel, 3 majors, 3 regimental staff (1 surgeon, 1 adjutant, 1 quartermaster), 12 captains, 24 lieutenants; total, 44. In each infantry regiment

8 (field and staff) mounted, 36 not mounted. In heavy artillery none mounted. Of the 361 regiments, let 61 be heavy artillery, 45 cavalry, 30 light artillery (four-gun batteries, 3 officers to a battery). Then we have :

61 heavy artillery regiments, 44 officers each at \$4 per day for 10 days	\$ 107,360
225 infantry regiments, 8 officers mounted, \$6 per day, 36 not mounted, \$4 per day	432,000
75 mounted regiments, 44 officers each \$6 per day	198,000
Estimate for travelling and incidental expenses	262,640
Total	\$1,000,000

Now as to the practical operation of the system. The colonel assigns to each captain as soon as he receives his commission, a recruiting station for his company, assigns the companies to battalions and designates battalion and regimental headquarters at the most convenient points for rendezvous. Each captain with his lieutenants, is to recruit his own company. The company officers should be acquainted with the people in the locality where their companies are to be raised so as to know what to expect and whom to depend upon when the time comes to recruit their companies, and so as to know beforehand the men likely to make good non-commissioned officers. Before the outbreak of hostilities the possibilities of war will be talked of and the officers and their friends will be on the *qui vive* and prepared for the order to recruit. The colonels should be sent to their districts beforehand if possible. Then, on the outbreak of hostilities, telegraphic orders are given to recruit. The recruiting stations are opened. As soon as men are provisionally accepted drill begins, the very day recruiting begins. As soon as the companies are filled they report at battalion or regimental headquarters as they may be directed. At the end of ten days all the companies must be at regimental headquarters whether filled up or not.

In the meantime a depot battalion should be organized under direction of the colonel, in case the whole regiment is called out, officered by those who have been mustered out of the regiment and who may be thought suitable for the duty. These officers continue the recruiting and keep the regiment filled up.

At the end of ten days then the regiment would be formed and in the hands of the colonel. In the meantime, arms, equip-

ments, clothing, camp equipage, etc., should be obtained and the men supplied. After the regiments have been about ten days by themselves the brigades, divisions and armies can be mobilized. This could be effected and the armies be in fair condition to receive an attack in ten days more. At the end of three months they would be in fair condition for an offensive campaign. The men should not be moved so much as to wear them out and disgust them. Heavy artillery regiments should go directly to the forts to which they belong. Plans should be carefully laid beforehand so that all regiments can go by the shortest, easiest way possible to their rendezvous, and so that all their time and energy can be spent in drills, which should be the almost constant occupation of the men during this short time of preparation.

General plans for mobilization can be laid down in time of peace, but can only be perfected when it is known what enemy is to be met and where he is most likely to attack. But plans for the mobilization of regiments and brigades can be perfected in time of peace, and by the time they are mobilized plans can be perfected for the divisions and armies. The heavy artillery regiments need not be brigaded.

Based, in the main, on the report of the Endicott Board of Fortifications, which is being substantially followed in fortifying our coasts, we estimate the number of heavy artillery troops necessary to man the fortifications at the various points, and assign the regiments as follows :

Portland, Me., 4 regiments—1st, 2d, 3d, 4th Maine.

(The ordinal numbers indicate congressional districts.)

Penobscot River, 1 battalion	} 1 regiment—1st New Hampshire.
Kennebec River, 1 battalion	
Portsmouth, N. H., 1 battalion	

Boston, 7 regiments—5th, 6th, 7th, 8th, 9th, 10th, 12th Mass.

New Bedford, 1 regiment—13th Mass.

Narragansett Bay, 3 regiments—1st and 2d R. I., 11th Mass.

New London, 1 regiment—3d Conn.

East end Long Island Sound, 2 regiments—4th Conn., 1st N. Y.

Hew Haven, Conn., 1 regiment—2d Conn.

New York Harbor, 9 regiments—7 from Greater N. Y., 6th & 7th N. J.

Philadelphia, 2 regiments—from the city.
 Baltimore, 2 regiments—from the city.
 Washington, 1 regiment—from the city.
 Hampton Roads, 2 regiments—1st and 2d Va.
 Wilmington, 1 regiment—6th N. C.
 Charleston, 2 regiments—1st and 7th S. C.
 Savannah, 1 regiment—1st Ga.
 Fort Clinch and Pensacola, 1 regiment—11th Ga.
 Key West, 2 regiments—1st and 2d Fla.
 Mobile, 2 regiments—1st and 2d Alabama.
 New Orleans, 1 regiment—1st La.
 Galveston, 1 regiment—10th Tex.
 San Francisco and San Diego, 9 regiments—7 Cal., 1 Nev., 1 Utah.
 Portland, Oregon, 2 regiments—1st and 2d Oregon.
 Puget Sound, 1 regiment—1 Washington.
 Lake Ports, 2 regiments—32d N. Y. (Buffalo) and 1st Mich. (Detroit.)

Total, 61 regiments heavy artillery.

Dividing the rest of the territory up into five nearly equal parts, according to population, we have the following :

Army of the North.—N. H., Vt., Mass., Conn., N. Y., N. J., Mich., Wis. 62 regiments, rendezvous in the vicinity of Albany.

Army of the East.—Pa., O., Ind. 62 regiments, rendezvous in the vicinity of Harrisburg.

Army of the South.—Del., Md., Va., N.C., W. Va., Ky., Ill. 57 regiments, rendezvous in the vicinity of Washington and Richmond.

Army of the Gulf.—S. C., Ga., Ala., Miss., Tenn., Ark., La. Texas. 62 regiments, rendezvous in the vicinity of Atlanta and Vicksburg.

Army of the West.—All the States and Territories west of the Mississippi except Ark., La., and Texas. 57 regiments.

Total, 300 field regiments.

Going into detail, each army department may be divided into divisions and brigades and the branch of service to which the regiment of each district shall belong may be assigned.

Headquarters for each regiment, brigade and division should

be designated, having in view the facilities of mobilization of itself and of the higher units. We have not space, nor is it necessary, to go further into details at present. The foregoing is simply a flat plan and would have to be modified on taking all the circumstances of each army into consideration. This is especially true with regard to the proportions of the various arms of the service. If the details are worked up with care and good judgment and the scheme once fairly launched, it will insure the United States an adequate, homogeneous force of volunteers, entirely under its control, ready for defense in a few weeks, for offense in a few months.

This idea of raising volunteers by so many per congressional district is not new. It was adopted by some of the States at the beginning of the Civil War, and was used by the Federal authorities in some cases in enforcing the draft. Colonel J. Sumner Rogers, Superintendent of the Michigan Military Academy, has for a number of years ably advocated substantially the same system as here set forth of having a skeleton organization for one regiment in each district, properly instructed and ready at a moment's notice to recruit and prepare the regiment for the field.

In Great Britain the volunteer militia is under the control of the War Office, paid, armed, inspected and furnished with salaried adjutants and drill masters.

Switzerland has no standing army, but has a corps of educated officers, and requires the service, for a few weeks at least, of every man in the republic able to bear arms.

In the United States we have, in all our wars, raised our volunteers by calling upon the States to furnish their respective quotas, and have allowed the States to appoint the officers, even after the volunteers were in the service of the United States. It is a system which we inherited from colonial times and the old Confederation and is not necessary under the Constitution. In the War of 1812 the nation was not yet cohesive enough to employ any other method. The Mexican War was sectional and so few volunteers were required that the old method worked as well as any other. In the Civil War the North called on the States for militia and followed that up by calling on the States for volunteers, the States to have the same rights with regard to

appointing officers that they had in the militia. We have no fault to find. The country was not prepared for war and did the best that could be done under the circumstances. But under the power expressly granted by the Constitution (Art. I, Sec. 8) "to raise armies" the general government has just as much right to raise volunteer armies directly as it has to recruit the Regular Army.

But the United States has never been prepared for war. Can we ever be prepared if we depend upon raising our volunteers by a sort of expansion of the volunteer militia system? This is a matter that has been so much discussed in army journals and elsewhere that we cannot pass it over without examination.

In the first place, it may be stated, without the necessity of demonstration, that if we are to do anything towards preparing a force in time of peace we must have *authority* over that force in time of peace.

Now the United States has no enforceable authority over the militia until called into its service. The militia can be called into its service only "to execute the laws of the Union, suppress insurrections and repel invasions." (Const., I, 8.) That would only be when serious trouble was afoot and the militia were instantly needed. Congress may indeed prescribe the discipline to be given, but the authority of training the militia according to the discipline prescribed is expressly reserved to the respective States. (Const., I, 8.)

The Constitution also reserves to the States the appointment of militia officers. (I, 8.)

So far, therefore, as any actual authority over the militia for purposes of preparation for war are concerned, the hands of the United States are securely tied. This much cannot be denied: the Constitution is explicit.

But this is not sufficient to satisfy the advocates of the organized militia expansion system (or State system as it might be called in contradistinction to the National system here proposed), who seem to take it for granted that we should raise our volunteers in the future by the same methods we have employed in the past.

It is not difficult, however, to show that the organized militia

itself never has been, is not now, and never can be expected to be, a suitable force with which to prosecute war; and to point out, at the same time, certain embarrassments to the general government that have heretofore arisen in the State system of raising volunteers.

The militia has been tried in three great wars and has been proved in every case a disastrous failure. It has been found as impossible in practice as it is in theory to form an efficient army out of heterogeneous organizations under absolute control of as many different sovereignties as there are States in the Union, until the crash of war comes and which, then, are only partially and conditionally transferred to the sovereignty upon which rests the responsibility of conducting war.

It is not necessary to recount the history of the militia in the Revolution and Washington's continual efforts to supplant it by more permanent forces; or its notorious inefficiency in the War of 1812, or its general lack of preparation in 1861. That is all a matter of history with which everyone is familiar.

But since the Civil War, a great change has taken place, especially in the larger and wealthier States. The organized militia is now in a much better condition in every way than it was then—so much better in fact as to be practically a different class of troops. This advancement has undoubtedly been brought about in a great degree by the active interest taken by the general government in its condition, welfare and improvement. The organizations in the different States are becoming somewhat more uniform in arms, equipments and dress, as well as in drill and discipline and in the qualifications of officers. But there is still and there must ever be in the nature of things, vast differences in the quality and efficiency of even the regiments of the same State, and differences vaster still between the organizations of different States. Some States make generous appropriations, have annual encampments and inspections by Regular officers and maintain their militia in excellent condition. Others have no annual training or inspection and make no appropriation at all. In some organizations the fact that a man is an officer is in itself a guarantee that he is, to a certain extent at least, an educated, intelligent soldier and gentleman; but in most militia organizations it must be confessed that the

majority of the officers are not properly fitted for the positions they hold.

With forty-five or more different standards of qualification how can we ever be sure of any uniformity in this most important particular?

The training of the militia being expressly reserved to the States, it is obviously impossible for the United States to safely rely upon the State forces being, as a whole, in an efficient condition when the occasion arises for calling them into service. The men are as a rule fairly well drilled and good material for soldiers, and some of their officers are in every way worthy and capable, but it is easily understood that with the elective system of making officers, very simple examinations or none at all, and the hap-hazard instruction they get—often from utterly incompetent sources—it is not possible to secure a full complement of competent officers even in time of peace.

But the most serious defect of the system is that we cannot tell at any time what to depend upon.

Suppose a Governor of a State doesn't think the Government has occasion to call out the militia, and doesn't obey the requisition?

Look at the state of affairs in Illinois at the time of the Chicago strike for an example of the difference of opinion between the National and State executives as to the necessity of using armed force. Or, suppose the militia doesn't happen to like the Governor, their Commander-in-chief, and refuse to obey his orders—as happened in South Carolina not long ago? Or suppose they actively sympathize with the people they are called out against, and refuse to do active duty against them—as in California in the year of the Chicago sympathetic strikes? These are recent and rather mild cases; for flagrant cases see the War of 1812 and the action of the border States in 1861. On the other hand, most of the Northern States, in the Civil War, with the most laudable spirit of patriotism, voted troops, money and supplies. But the supply officers sent into the markets by the States were rival bidders for goods with the United States, until the general government had to beg the States to desist and let it furnish supplies for the troops—without rivals in the markets, obtaining supplies for the very same men.⁶ The

extra pay and bounties so generously offered by the States to volunteers prevented the United States from obtaining recruits for the Regular Army. These are some of the objections to raising volunteers through the medium of the States. There is no reason why the same things that occurred in the Civil War should not occur again, unless we inaugurate some system that shall free the general government from the obligation of catering to the political and military aspirations of every "boss" in the country, some system in time of peace that shall make the Federal Government a single, supreme power in all matters pertaining to war—certainly in the most important of all, the raising and training of her armies. When it comes to a question of a purely national affair, such as war, it is time to stop tampering with "States rights," and to centralize all the strength of the nation.

CONSCRIPTION.

In connection with the subject of volunteering, must always go the possibility of conscription. For suppose we depend upon volunteers and they do not offer in sufficient numbers—as happened both South and North in the Civil War—what are we to do?

Our people have always been more or less opposed to the idea of conscription. This aversion was increased in the War of 1812, when it was first proposed to enforce a conscription in this country. The North, New England especially, was violently opposed to the war and consequently to all the measures proposed for carrying it on. There were at the outbreak of that war ten old regiments in the Regular Army, with ranks half filled, scattered all over the country on garrison duty. Congress authorized ten new regiments of Regulars, 50,000 volunteers, and also 100,000 militia to be detached from the States and mustered into the service of the United States. Upwards of 20,000 men were needed for the Regular Army. Enlistments began in March and in June not 4000 had been secured. Not many more than this number appeared for the volunteers. Some of the States refused to order out the militia, even for local defense, unless actually invaded. In 1814, 100,000 men were wanted. "That so great a number could be raised in a

few weeks when the utmost exertions of two years had never been able to put forty thousand under arms was beyond belief." The Secretary of War therefore proposed conscription. But the conscription bill met with bitter opposition in Congress and was finally lost.

In the Civil War, the Confederate Congress passed a conscription law early in 1861 and the Union Congress in 1862. The Union law provided for the enrollment by provost marshals and enrolling officers of all able bodied males, with certain exemptions, between the ages of 18 and 45. From these were to be chosen by lot the number necessary to make up the quota. Any one drafted was at liberty to send a substitute or pay \$300 commutation. It became necessary to enforce the law in the summer of 1863. It was opposed by many on the ground that it was unconstitutional and on account of the commutation and substitute provisions. The law was declared in several Federal courts to be unconstitutional.⁷ It did seem to be unfair to exempt a man simply because he was able to hire a substitute or pay \$300, and make the poor devil who had to spend everything he could earn to support his family abandon it and go to war. As Senator Mason said in 1814: "The rich man will find his substitute, but the apprentice is to be forced from his workshop and the farmer from his fields, the mechanic is to be made to abandon his business and the poor man his family, for the space, if needs be, of two long years."

The attempt to enforce the draft led to serious rioting in New York City for four days, July 13th to 17th, 1863. Over two million dollars worth of property was destroyed and many lives lost. The rioting was finally stopped by some Regular troops and volunteers sent back from the theatre of war. The rioters, it was claimed, were mostly Europeans. The Governor of New York was an opponent of the draft and tried to get President Lincoln to suspend it. But the President replied that conscription had been resorted to in the South, and that "It produces an army with a rapidity not to be matched on our side, if we first waste time to reëxperiment with the volunteer system, already deemed by Congress and palpably in fact, so far exhausted as to be inadequate, and then more time to obtain a court decision as to whether a law is constitutional."

New York City, by giving large bounties, managed to secure volunteers without resorting to the draft again.

There was also a slight resistance in Boston, Jersey City, Troy and Jamaica, N. Y., and in some counties of Wisconsin and Pennsylvania.

Every effort was put forth to get volunteers, so as not to push the draft any harder than was absolutely necessary. Big bounties were offered. Some of the most despicable characters in the country found their way into the ranks, "bounty jumpers," who proceeded to desert at the first opportunity, to reënlist somewhere else for another bounty.⁸ Rewards of so much a head were offered to recruiting officers for each recruit accepted.

General McClellan said that the number of troops on foot in April, 1862, were enough to put down the war, if the regiments had been kept filled. "Instead of this, spasmodic calls for large numbers of men were made, and the general rule was to organize them into new regiments, often allowing the invaluable old regiments to die out. This system was infinitely more expensive, but gave opportunity to promote personal or political favorites." "Common sense and the experience of all wars proves that when an army takes the field every possible effort should be made at home to collect recruits and establish depots, where the inevitable daily losses may be made good with instructed men as fast as they occur, so that the fighting force may be kept up to its normal strength."

"During the preceding autumn [of 1861] I advocated a system of drafting, but it was not listened to. Had it been adopted at that time, when recruiting was rapid and easy, it could have been established and well regulated without difficulty and without any shock to the country."

With proper exemptions, and with the substitute and commutation features left out, the method of recruiting an army by conscription secures a much better class of men than by the offer of large bounties. A man may have various ties to keep him at home and might well consider the duty of staying at home to be above the duty of volunteering for war. But let a superior power step in and say "You must go," he cheerfully obeys.

A nation cannot possibly utilize its full military strength without a resort to conscription. Plans for putting it into exe-

cution should be perfected in time of peace, become familiar to the people, and be ready for execution whenever the occasion may arise.

ADVANTAGES.

Some of the advantages of the foregoing system are :

1. The conduct of war and all means for conducting war are placed in the only hands that hold the authority of declaring war and concluding peace. No complications with state authorities, no divided responsibility.

2. Arms and supplies purchased by the United States without competition with the individual States. Supplies may be accumulated in each army territory and the amount and kind that can be obtained on short notice may be noted, together with the capacity of manufacture. So when they are needed the supply officers will know just where to turn to obtain them.

3. *Esprit de corps*, such a valuable quality in any organization, will be fostered by localizing regiments and recruiting them at their own homes. By having a depot company or battalion in each district the forces may be readily increased by adding to the number of men in each company, adding new battalions or forming new regiments. The officers of the depot battalion may also be entrusted with enforcing the draft if necessary.

4. It will be of great advantage to the organized militia, and will do more to secure uniformity in the militia than any one thing yet proposed ; for many officers of the volunteers, having passed rigid examinations and receiving systematic military instruction annually from professional soldiers, will be elected officers of militia, and so, in turn, become their instructors in the same things.

Now, the question naturally arises, what is to happen when war breaks out and the organized militia and volunteers are called out at the same time ? It may be noted in passing, that this question is not peculiar to the system here proposed but is bound to arise in any case where the militia and volunteers are called out at the same time. But the answer is simpler perhaps, and more satisfactory in this case than in any other. Of course there will be a great many men in the organized militia who will wish to volunteer for the war. Let each volunteer

officer who is a captain or field officer of militia remain on duty with the militia, recruiting the volunteers so far as possible from the men with whom he is serving. The other volunteer officers at home recruit sufficiently to fill up the companies. Now when the volunteers come forward to take the place of the militia the volunteer officers serving in the militia, with their men, join their proper organizations.

Some of the best militia regiments are those that would wish to remain in the service the shortest period in time of war. Take the Seventh Regiment of New York, for instance—the crack militia regiment of the United States before the war, the original “National Guard.” It made special arrangement with the War Department in 1861 by which it was to remain in the United States service only one month instead of three. It afterwards furnished enough officers of volunteers to make a whole regiment, and at the same time kept up its organization as a militia regiment all during the war, doing valuable service both at home and at the front in emergencies. It would certainly have been bad policy to keep those men together as a regiment instead of scattering them abroad to officer and instruct the raw levies.

So it would be again. Militia organizations are partly military, partly social, and some crack regiments and crack troops of cavalry contain a large proportion of men of character, education and capacity fitting them for the position of officers. We ought to make use of such men in positions where they can do the most good to the hosts of new men we shall have to turn into soldiers in a short time. The State and National governments ought to continue doing everything within reason to foster the organized militia and make it as nearly uniform with the national forces as the nature of the case admits. In addition to being a local and emergency force it is also a sort of training school for the volunteers.

5. The advantage to the Regular Army officers and men would be very great. It has been the fashion in some quarters to discourage the young officer from devoting much attention to the duties of higher commanders; an officer ought to confine his attention to perfecting himself in the duties of the office he holds. But the writer does not endorse this advice—cer-

tainly not for the officer of our Regular Army—because the probabilities are that he will have a higher command in time of war, and he should fit himself not only to perform the duties of the office he holds, but of higher offices as well. Every officer of the army of five years' service has a right to aspire to the command of a regiment in war, and should fit himself to perform the duties of all grades leading up to it. Any officer assigned as colonel of a volunteer regiment would have to learn, to the minutest detail, the duties of all regimental and company officers. And so this system would make Regular officers think and study about much higher commands than they now hold, and keep before their minds what might be expected of them in time of war.

And as to the enlisted men, many will be able to obtain the position of "candidate" for whom there are no vacancies in the Regular Army. They would be able to obtain a position among the volunteer officers. And so the cadets who have been from six months to four years at West Point and have failed. They would make excellent officers of volunteers; and whereas they are now lost sight of and their military knowledge almost lost, under this system they could be kept in sight and untold benefit derived from their military knowledge.

Army officers who resign, by becoming officers of volunteers, would still be able to continue in the United States service without interfering with their civil pursuits.

General Miles, the present Commander of the Army, has recommended a most logical, and at the same time the most reasonable, size for the Regular Army. It is to have the number in the army bear a certain ratio to the population of its country; proposing one thousand men to each two millions of population, with authority in the President to increase to a maximum of one thousand men to each million of population in an emergency. This would give us an adequate standing force and one that could be expanded quietly, in an emergency, without exciting alarm.

It is to be hoped that we shall never again be reduced to such a pass that it will even be suggested that the Regular Army be broken up and scattered among the volunteers. But there should be some system by which the regiments or brigades

of the Regular Army could be assigned to the various armies and held together to serve as a model organization, a *corps d'élite*—if such a term be not offensive to our republican ears. One-third of the line officers of the Regular Army could be spared in an emergency without sensibly impairing its efficiency. So it is believed that the officers required by this system to be detached from their regular commands may be of paramount benefit to the volunteers without prejudice to the Regular service.

6. At over one hundred schools and colleges army officers are on duty as military instructors. In some the students are not obliged to attend either practical or theoretical instruction, and comparatively few volunteer to do so. In others, one or two classes only are required to attend two or three times a week during part of the college year. In others, attendance two or three times a week is compulsory during the entire college course. In purely military schools the cadets are under military discipline and under more or less military instruction during the entire course. Many, perhaps, of the students get some idea of what military discipline is, learn the elementary drill movements—and that is all, except that they may remember a few isolated facts from the lectures they listen to. A great many learn considerably more from lectures and recitations on military subjects and obtain a pretty fair knowledge of military administration and of minor tactics. A comparatively few obtain what may be considered a fair military education.

Now, what practical benefit does the country derive from all this military instruction? From each school three students standing highest in a military sense are annually reported by name to the War Department and to the Adjutant General of the State. They are then lost sight of, together with all the rest. We hope that somehow when war breaks out these men will come to the front.

This system proposes to give these young men something to strive for—a commission in the United States volunteers. It proposes to encourage those having the best military education to keep up their military interests and studies until they not only prove themselves fitted to become officers but do actually become officers of volunteers. In this way we shall obtain some actual, practical return for our outlay in giving military instruc-

tion to students, and at the same time stimulate students to attain higher standards in the military department.

7. Finally, this system, at a most reasonable cost,⁹ gives a complete and elastic volunteer organization, with a full complement of competent officers, always ready at a moment's notice to raise, equip, train and mobilize our volunteers for war. There is nothing tentative about it. All is under absolute control of the United States, even to filling the regiments by conscription. It is independent, safe. All is made ready beforehand, so that when the time comes the carefully laid plans may be swiftly, smoothly, silently executed.

"And the house, when it was in building, was built of stone made ready before it was brought thither: so that there was neither hammer nor axe nor any tool of iron heard in the house, while it was in building."—I Kings, 6, 7.

NOTES.

1. The writer understands the strict use of the word "militia" in the United States to refer to the whole body of men liable to be enrolled under the militia laws. The general and popular acceptance of the word, however, makes it mean the same as "enrolled militia," "organized militia," "volunteer militia," "State troops," or "National Guard." The writer has generally, in this essay, used it in its popular sense.

2. This number was increased to about 2000 by the close of the war.

3.

Arkansas	1,019
Colorado	1,802
Idaho	613
Illinois	6,743
Indiana	2,940
Iowa	2,516
Kansas	1,655
Kentucky	1,667
Michigan	2,864
Minnesota	2,009
Missouri	2,349
Montana	459
Nebraska	1,333

27,969

Nevada	371
N. Dakota	528
Ohio	5,988
S. Dakota	806
Tennessee	1,821
Utah	938
Vermont	728
W. Virginia	881
Wisconsin	2,622
Wyoming	415
Arizona	488
N. Mexico	433
Oklahoma	613

16,632=44,601

4.			
Idaho	613	Montana	459
Illinois	6,743	N. Dakota	528
Indiana	2,940	Ohio	5,988
Michigan	2,864	Vermont	728
Minnesota	2,009	Wisconsin	2,622
	<hr/>		<hr/>
	15,169		10,325=25,494

—“*The Organized Militia of the United States in 1896.*” A. G. O.

5. JOURNAL MILITARY SERVICE INSTITUTION for Nov., 1893, p. 1162.

6. See Benedict's “Vermont in the Civil War.” Vol. I., p. 97.

7. In the War of 1812, the raising of a State force by conscription was declared by Chancellor Kent to be unconstitutional.

8. In one case a veteran volunteer regiment was placed as a guard over a battalion of these fellows in Newark, N. J., to prevent their desertion almost in a body. Such men should not be allowed to masquerade as soldiers, if we can prevent it.

9. Our pension expenditures at present are enormous, yet if we have another war in our unprepared condition we shall have another long pension list added to the one we already have. It is only right and just to pension those disabled by war for the Union and families left destitute by the death of those who gave their lives for the nation, but true patriotism dictates that we should make every reasonable effort to be prepared to conduct a war, if it becomes inevitable, with the smallest possible losses. A small expenditure of money in preparation may save many thousands of lives and many millions of money.

THE PHYSICAL PROPORTIONS OF THE AMERICAN SOLDIER.*

BY MAJOR HENRY S. KILBOURNE, SURGEON U. S. ARMY.

THE most capable men† of any race or nation, are the typical men; the typical men are those whose physical proportions vary least from all others; whose like in any large group of a people, is found in greater numbers than any other. From this class, all others are deviations, on an ascending or descending scale of dimensions, and a diminishing scale of numbers; hence it follows that the law of deviation having been established from a sufficiently large number of observations, the standard type may be calculated for a still larger number, or for all. Degree of representativeness then becomes the standard of degree of evolution. Three dimensions of the body have hitherto had general acceptance in estimating the physical powers of men; these are stature, chest-girth—including chest-capacity—and body weight, and despite other refinements of modern science, which has attempted to substitute and supplement them, these three within certain limitations, still hold good. It has been ascertained that for every inch of height, between five and six feet, the extreme breathing capacity ("vital capacity") is increased eight cubic inches; the vital capacity is at its maximum at 35 years of age, and there is an annual decrease of 1.21 cubic inches onward to 63 years, backward to 15 years of age.‡

The influence of weight on capacity of respiration is less marked than that of height. It is well known to physiologists, that the respiratory processes are intimately connected with the nutrition of the body. These facts support the theory that the physical power of a race, or people, and consequently their capacity for work, is directly as their average stature. The

* Read before the Association of Military Surgeons of the United States at the Seventh Annual Meeting.

† *En masse*.

‡ Landois' Physiology.

limitations of height to physical capacity are important. The law holds good between the extremes of five and six feet, certainly for the white races, and probably for all. Height above six feet, rarely implies a corresponding increase of physical powers; giants are really a feeble folk; and among men of Saxon and Celtic lineage the opposite limit of five feet, is much too low for efficiency. Above the height of six feet, the increase is generally in the lower limbs, without a corresponding development of the trunk and augmentation of strength and endurance. When however, the increased dimensions are symmetrically distributed, there is a maximum of power, though not necessarily of endurance. The majority of powerful men are in stature, nearer the average; but blood and fineness of fibre count for work. A man of five feet three inches, may have staying power equal to the best, but as a rule he will not be able to stay long in the company of men of five feet eight inches; but if of the Latin blood, he is not far below the type of his fellows. Stature is largely a matter of race, yet within racial lines it is also a matter of class, and among classes, it is affected by age and occupation, but most of all by the standard of living. A well-fed people will, other things being equal, surpass in stature those habitually under-fed; scantiness of food arrests growth. The health and strength of all peoples are intimately dependent on their diet.* Among civilized people, the professional classes are everywhere superior in height to the laboring classes; the white races are generally taller than the dark races. The Anglo-Saxons, Celts and Scandinavians are of greater stature than the peoples of Southern and Eastern Europe. Americans, a composite people, in whom the blood of Northern Europe predominates, are taller than their German and English ancestors; and of Americans, the men of the West and South are of greater height than those of the North and East. Among the American aborigines, the dominant tribes of the North, the Iroquois, Sioux, and Nez Percés, were of greater stature than the Comanches and Cherokees of the South.

The following table exhibits at a glance the average stature of peoples of various races and nationalities and especially the

* Atwater—Chemistry and Economy of Food, Bull. 21, U. S. Dept. of Agriculture, 1895.

height of the immigration classes of the United States, according to the latest available authorities.

Race or Nationality.	Authority.*	Remarks.	Metres.	Feet	Inches.
Polynesians . . .	Various . . .		1.762	5	9.33
Patagonians . . .	D'Orbigny . . .		1.754	5	9.00
Angamis . . .	Woodthorp . . .	Naga Hills . . .	1.754	5	9.00
Negroes . . .	Topinard . . .	Congo . . .	1.752	5	8.95
Scotch . . .	Brit. Anth. Com. . .		1.746	5	8.71
N. A. Indians . . .	Baxter . . .		1.728	5	7.93
Irish . . .	Brit. Anth. Com. . .		1.725	5	7.90
U. S. White . . .	Baxter . . .	Northern U. S. . .	1.719	5	7.67
English . . .	Baxter . . .		1.719	5	7.66
Norwegians . . .	Baxter & Beddoe . . .		1.719	5	7.66
Zulus . . .	Roberts . . .		1.707	5	7.19
Scotch . . .	Baxter . . .	U. S. Immigrants . . .	1.705	5	7.06
Canadians . . .	Baxter . . .	U. S. Fr. Immig. . .	1.703	5	7.01
Swedes . . .	Baxter & Beddoe . . .	U. S. Immig. . .	1.700	5	6.90
Irish . . .	Baxter . . .	U. S. Immig. . .	1.698	5	6.74
Welsh . . .	Brit. Anth. Com. . .		1.695	5	6.66
Danes . . .	Baxter . . .	U. S. Immig. . .	1.694	5	6.65
Dutch . . .	Baxter . . .	U. S. Immig. . .	1.693	5	6.62
Amer'n Negroes . . .	Baxter . . .		1.693	5	6.62
English . . .	Baxter . . .	U. S. Immig. . .	1.692	5	6.58
Hungarians . . .	Baxter . . .	U. S. Immig. . .	1.692	5	6.58
Germans . . .	Baxter . . .	U. S. Immig. . .	1.691	5	6.54
Swiss . . .	Baxter . . .	U. S. Immig. . .	1.687	5	6.38
Russian . . .	Baxter . . .	U. S. Immig. . .	1.687	5	6.38
Belgians . . .			1.687	5	6.38
French . . .	Baxter . . .	U. S. Immig. . .	1.683	5	6.27
Poles . . .	Baxter . . .	U. S. Immig. . .	1.682	5	6.20
French . . .	De Quatrefages . . .	Upper Class . . .	1.681	5	6.14
Germans . . .	Novara . . .		1.680	5	6.10
Mexicans . . .	Baxter . . .		1.680	5	6.10
Italians . . .	Baxter . . .	U. S. Immig. . .	1.677	5	6.00
Austrians . . .	Novara . . .	Slavs . . .	1.669	5	5.68
Spaniards . . .	Baxter . . .	U. S. Immig. . .	1.668	5	5.66
Portuguese . . .	Baxter . . .	U. S. Immig. . .	1.663	5	5.43
French . . .	De Quatrefages . . .	Working Class . . .	1.657	5	5.24
Bavarian . . .	Novara . . .		1.643	5	4.68
Chinese . . .	Novara . . .		1.630	5	4.17
Poles . . .	Mayer . . .		1.622	5	3.87
Japanese . . .	Ayrtoun . . .		1.604	5	3.11
Malays . . .	Various . . .		1.583	5	2.34
African Pigmies . . .	Stuhlman . . .		1.250	4	1.21

* Smithsonian Reports, 1884, mainly.

We note in the foregoing list, the obvious superiority of the Celts among northern Europeans; the Scotch overtop all the whites and are closely followed by the American Indians. The

most notable feature for our attention, is the variation from the averages given by other authorities, of the foreign population of the United States as computed by Baxter from the measurements of more than half a million of enrolled men, from which the Federal armies were drawn during the American Civil War. In some instances there is shown a gain and in others a falling off in height; the latter is marked in British immigrants, while in the French there is a gain over the higher class of their nationality. Among the United States' whites, of Baxter, the Southern States which had formerly furnished the tallest men for the army, are not proportionately represented. The true standard for the native Americans of that period is probably nearer sixty-eight inches. Taking the largest statistical group of native white Americans, now available for study, we have the following exhibit for the determination of the height and chest girth of the men of the North and West, of the last generation.

TABLE SHOWING THE HEIGHT, CHEST-GIRTH AND AGE OF
190,621 NATIVE WHITE AMERICANS, EXAMINED AND AC-
CEPTED FOR THE MILITARY SERVICE OF THE U. S. 1863-65
(BAXTER).

Height.	Number.	Age 18 to 45.	Chest Girth.	Remarks.
Under 61 inches . .	609			
61 to 63 " . .	4,929			
63 to 65 " . .	21,712	Mean Age	Mean Chest Girth.	
65 to 67 " . .	47,731	26.96 Years.	35.25 inch.	
67 to 69 " . .	58,348	Type.
69 to 71 " . .	38,935			
71 to 73 " . .	14,858			
73 inches and over .	3,499			
Total	190,621	Mean Height, 67.35.		

In this group the number of men below 63 inches in height is seen to be but little greater than that of the class above 73 inches. The most numerous and therefore the typical class, is included between 67 and 69 inches. This standard class having a greater number of other classes below, than above, it would accordingly have a greater chest girth than the average for the whole group. For the sub-groups, the data are incomplete.

The following tables afford figures of a later date, but of numbers not sufficiently large for a safe generalization :

TABLE OF PHYSICAL PROPORTIONS OF NATIVE WHITE AMERICANS OF DIFFERENT CLASSES.

CLASS.	Number.	Years Mean Age.	Inches Mean Height.	Pounds Mean Weight.	Chest Measurements.			Ratio of Weight to Height.
					Inches Mean Chest Girth.	Inches Mean Chest Mobil.	Cu Inches Mean Chest Capacity.	
U. S. Naval Cadets.* . .	272	24.01	67.69	137.86	34.14	3.33	2.42	2.036
Amherst College Students.† .	1416	14.18	68.31	139.90	36.74		2.61	2.033
U. S. Army Recruits, Native White . .	4547	26.80	67.50	145.06	35.58	2.91		2.134
U. S. Naval Cadets.‡ . .	125	23 to 27	67.80	139.00	34.30	3.50	2.44	2.050

* Gihon. Reference Hand Book of the Medical Sciences.

† Annual Report of the Surgeon General U. S. Army, 1895.

‡ Gihon. *Ibid.*

The mean height of 125 U. S. Naval Cadets above the age of 23 years, was 67.80 inches.* As these men are drawn from all parts and classes of the United States, they represent very nearly the typical physical development of the American people of 25 years of age. From what source has the superior stature of the American been derived? Assuming that the relative height of the ancestors of the Colonists was as their national types remain to-day, we find the racial type of stature in the large-limbed Celt, whose physical proportions are still the first in Europe. Next in order is the English blood, a composite strain bred on the Anglo-Saxon stock. The Northmen are third, led by the Norwegians and Swedes, the Danes ranging below the latter, but above the Germans. All these are well above the average height of man.†

The relation of body weight to vital capacity, appears in the

* Gihon. *Ibid.*

† 5' 5.25".

physiological law, that when the body weight exceeds the normal by 7 per cent., there is a diminution of 37 c.c. (2.2 cu. in.) of vital capacity for every kilo (2.2 lbs.) of increase of weight.* This again confirms the view that respiratory capacity, rather than body weight, is the better indicator of the physical stamina of a people.

Assuming the normal weight to vary with race and climate, which is probable, the average American of 145 lbs. would begin to be overweight at 155.16 lbs., and beyond that weight would lose in vital capacity. Considering these figures, we are inclined to believe that too much importance has hitherto been attached to the value of the ratio of weight to height. Effective weight should be chiefly in bone and muscle, for fat more than is necessary for filling in and rounding the figure is dead weight, and diminishes, rather than augments capacity for work.

The maximum American army service weight of 190 lbs. is well placed; an overweight man is handicapped by his surplus flesh and expends his energies in carrying it about. But the underweight man lacks quantity of bone and muscle for effective work. Muscle may be built up on a sound frame, as a builder fills in the material of a house, but the trainer cannot, like the builder, supply certain essential materials, where nature has failed to provide them; he can only enlarge and develop what is already in place. The elemental muscular fibres must not be wanting in the human structure. According to Gihon, increase of height practically ceases with the twenty-third year, which he considers the period of completion of adolescent growth,† but his record of measurements of cadets shows an increase beyond that limit, and the record of Amherst students exhibits a gradual increase of stature up to the twenty-sixth year, with a corresponding increase of chest girth and weight. Military statistics confirm the view that development continues into the sixth quinquennium, and that the maximum development of Americans is found between the ages of 25 and 30 years. After the period of full development is reached, the

* Landois' Physiology.

† Surgeon Beyer, U. S. Navy, from observations on Naval Cadets fixes this period two years earlier.

excess of nutritive material, over and above that required to maintain the body in health, is deposited in fat; and it will be found that a disproportion of weight over height occurs usually in adults or men of middle life.*

The effects of systematic physical training on the development of the body are too well known to require more than an allusion here; it is not perhaps so well known that such training is capable of increasing the stature on an average of one and three-fourths inches above the limit attained without training; and what is of more importance, it has been shown, that the taller the individual at the beginning of the training, the greater also was the amount of weight and strength gained by the exercise he was made to perform; an increase in height, therefore, means a corresponding increase in strength as well. "The agent, whatever it may be," says Surgeon Beyer, "which influences height, must be profound as well as far-reaching, for growth in height means growth in bone".†

Most important of the three body dimensions are those of the chest; three kinds of chest measurements are employed. These are the chest girth, chest mobility,—or expansion in respiration—and chest capacity ("vital capacity"). These, although closely related, are not convertible terms. A man may have a large chest, without amplitude of expansion or mobility; the chest in well-developed men is ample, it contains the vital machinery and represents the staying powers of the man.

The average vital capacity (volume of air expired in forced respiration) in well developed Americans is rather more than a gallon (U. S. standard 231 cu. in.). The tidal air of ordinary quiet breathing is about a pint. The chest expansion, in mature, well-formed Americans is about three inches, which is the difference in chest girth in full expiration and inspiration. The later reports of the Surgeon General of the U. S. Army furnish data for comparison of the physical proportions of the native white, colored and foreign population, from which recruits are drawn. The ratio of foreign-born to natives, in the following table, is much larger than in the aggregate population, and,

* Greenleaf's Epitome of Tripler's Manual.

† On Normal Growth under the Influence of Gymnastic Exercise—Report of the Surgeon General, U. S. Navy, 1896.

as during the present year, enlistments have been restricted by citizenship, the military service has already become more representative in character. The tide of foreign immigration, which has been large and continuous for more than half a century probably touched high water in the census of 1890; at that period, in a total population of sixty-two and one-half millions, nine and one-fourth millions were of foreign birth; a ratio of 1 to 6.77. Of 7434 recruits accepted during the year 1894, there were native whites, 4547; foreign whites, 2388; negroes, 499, with a ratio of foreign to native white of 1 to 2. A large majority of the foreign recruits were British and Germans.

AVERAGE HEIGHT, WEIGHT, CHEST MEASUREMENTS, RATIOS OF WEIGHT TO HEIGHT AND RELATIVE ORDER OF PHYSICAL PROPORTIONS OF 16,077 RECRUITS ACCEPTED FOR THE U. S. ARMY, DURING THE YEARS 1894-95, ALSO OF 197 INDIANS ACCEPTED IN THE YEAR 1892.*

RACE OR NATIVITY.	Number examined and accepted.	Average height, inches.	Average weight, pounds.	Chest Measurements.			Ratio of weight in pounds to height in inches.	Order of height.	Order of weight.	Order of chest mobility.	Order of ratio of weight to height.
				Expiration, inches.	Inspiration, inches.	Mobility, inches.					
1894 Aver. Age 26.8, U. S. Native, White.	4547	67.50	145.06	34.08	36.99	2.91	2.14	II	IV	III	III
Foreign Born, White.	2388	67.18	146.77	34.63	37.57	2.94	2.18	IV	II	II	II
American Negro. . .	499	67.21	149.19	34.25	36.83	2.58	2.21	III	I	IV	I
American Indian . .	197	68.30	146.04	33.64	36.80	3.16	2.13	I	III	I	IV
1895. Aver. Age 27.2, U. S. Native, White.	5699	67.68	145.68	34.26	37.17	2.91	2.15	II	IV	III	III
Foreign Born, White.	2351	67.14	147.18	34.80	37.73	2.93	2.19	IV	II	II	II
American Negro. . .	593	67.37	149.85	34.27	36.89	2.62	2.22	III	I	IV	I
American Indian . .	197	68.30	146.04	33.64	36.80	3.16	2.13	I	III	I	IV

The salient features shown in the detailed tabulations are, first, a regular increase in all the dimensions up to, and including the group of the mean age. Second, an increase of weight with

* Reports of the Surgeon General of the Army, 1893-95-96.

age beyond maturity. Third, a loss of height and chest expansion with advancing age beyond the fortieth year. These features appear constant in all classes of the recruits of the three years, excepting that the maximum height of the Indians and of the recruits of 1895, was attained before the twenty-fifth year. Comparing the averages of the foregoing table, we find that of the four race classes the negro has the greater weight, and the native white the least; the greater chest girth is shown by the foreign white and the least by the Indians; the native white is superior in stature to all but the Indians. The relation of stature to vital capacity is marked in the savage; his additional inch of height taking him to the head of the list in respiratory power, notwithstanding his lesser chest girth, both before and after the period of maturity. On the other hand, the surplus weight of the negro goes along with the diminished lung power. The slight superiority of stature of native whites is not accompanied by a corresponding increase in respiratory power. The larger ratio of height to weight does not take with it an increase in chest capacity in the negro. A comparison of the totals of all ages is vitiated by the greater youth of the native whites. But it appears that notwithstanding a greater proportion of their number below the age of 25 years, their mean average chest expansion was but .03 inch less than that of the older foreign whites. While in the immature class, the native white, with the least weight and one-half inch less chest girth, has a chest expansion which is practically the same as his foreign comrade. Selecting the two groups, between 20 and 30 years, the results differ somewhat.

In the following table, the all-round superiority of the savage at the period of maturity is strikingly obvious. The comparison is valuable, however, only as showing the physical proportions of the highest class of the aborigines, the principle of selection in their case having been carried further than has been done in other selections of the majority of soldiers. The actual gain in weight here shown in the native whites, on reaching maturity, does not appear to be accompanied by a corresponding gain in the relative order of the respiratory power. On the whole then, the native white soldier appears to be taller and slighter in mould than his foreign comrade; he has accordingly less juice and more

bone. These features he has acquired in part from his native soil, over whose dryer continental areas lately roamed a tall and sinewy aboriginal race. Considering the body as a machine, the American workingman has as strongly built a machine as any

AVERAGE HEIGHT, WEIGHT, CHEST MEASUREMENTS, RATIO OF WEIGHT TO HEIGHT AND RELATIVE ORDER OF THESE PHYSICAL PROPORTIONS OF 5337 RECRUITS FROM 20 TO 30 YEARS OF AGE, ACCEPTED DURING THE YEAR 1894, AND OF 139 INDIANS ACCEPTED DURING 1892 : *

RACE OR NATIVITY.	Number examined and accepted.	Average height, inches.	Average weight, pounds.	Chest Measurements.			Ratio of weight in pounds to height in inches.	Order of height.	Order of weight.	Order of chest mobility.	Order of ratio of weight to height.
				Expiration, inches.	Inspiration, inches.	Mobility, inches.					
Age 20 to 24 Years, Average 22 Years, U. S. Native, White	2332	67.49	123.6	33.88	36.78	2.90	2.127	II	IV	III	III
Foreign Born, White	838	67.21	144.5	34.36	37.28	2.92	2.147	IV	III	II	II
American Negro. . .	188	67.24	145.8	34.22	36.70	2.48	2.168	III	I	IV	I
American Indian . .	93	68.55	145.2	33.67	36.93	3.26	2.116	I	II	I	IV
Age 25 to 29 Years, Average 26.8 Years, U. S. Native, White	1103	67.58	146.5	34.33	37.27	2.94	2.167	II	III	III	IV
Foreign Born, White	657	67.22	145.9	34.48	37.50	3.02	2.170	IV	IV	II	III
American Negro. . .	119	67.40	149.7	34.08	36.74	2.66	2.221	III	II	IV	II
American Indian. . .	46	68.45	152.2	34.40	37.72	3.32	2.223	I	I	I	I

NOTE.—Standard minimum height 64 inches. Minimum weight 125 lbs. Minimum chest-girth 32.50 inches. Minimum chest mobility 2 inches. Minimum age 21 years, except by consent. Maximum height governed by maximum weight. Maximum age 30 years, excepting reënlistments.

other and more fuel to run it with than his European brother. While it is not absolutely proven, it seems in the highest degree probable that the higher standard of living, the better nutrition of the body, the larger product of labor and the higher wages go together.† In estimating the physical capacity of the people,

* Reports of the Surgeon General, U. S. Army.

† Atwater—Bull. 21, U. S. Dept. of Agriculture.

the question of quality cannot be excluded. Apart from stature and muscular development, the uncivilized man is less powerful than the civilized man ; he is unable to expend suddenly as great an amount of force, and he is unable to continue the expenditure for so long a time. An irregular food supply, mostly inferior in quality, dirty and uncooked, besides entailing mechanical loss, gives to the primitive man only an irregular supply of nervous power, smaller in average amount than that which follows good feeding.*

Another question remains to be considered, What is the proportion of these able-bodied men to the entire population ? The number of recruits rejected on primary examination, as shown by the reports quoted above, equals the number accepted. The causes of rejection, though mainly diseases and deformities constituting imperfect physique, also include mental and moral infirmities, as well as some disqualifications referable to social and political status. The census of 1900 will show of men of all classes, from 20 to 29 years of age—the flower of the nation—a number exceeding six millions ; dividing this number by two, there will remain a possible military potential of three millions of this class alone ; not of soldiers, but of the raw material of which soldiers are made. If but one in five should be called into service, they might compose an army larger than any now organized. General anthropometric statistics of the American people are yet wanting ; those collected during the Civil War pertained chiefly to the Northern States, already depleted of the flower of their youth : No similar records of the Confederate armies are available, and the Southern States prior to the war, furnished the larger men of the army. Since the war, the South has, excepting colored men, furnished comparatively few soldiers. While military statistics cannot be accepted as conclusive in estimating the physical character of a nation, unless the army be the nation in arms and the quiescent army the people, all available statistics tend to prove that an enrollment of the American people, which would separate all those incapacitated by disease and infirmity, would show a physical development not below any standard, and second in quality of form and condition to no other in the world. Our figures thus far have enabled us to ar-

* H. Spencer, *Sociology*.

rive with tolerable precision at the physical proportions of the average American. But such a method produces an arithmetical phantom—not a veritable man—for by actual enumeration few will be found to conform exactly to a standard so obtained. By the method of counting the most numerous class between fixed limits of height, a standard type of stature is obtained. From this basis by a continuation of the method, the other physical proportions are deduced, and a rational and practical standard secured. We turn in vain to the enormous assemblage of figures in the census for such data. Buried in this huge statistical shell heap, lie many things of value to the statesman, the economist and the politician, but the physical proportions of the American people are not yet to be found among them.

And here finally comes into view a significant question: The Americans are a composite people resulting from the blending of various nationalities; the type now is, and for some indefinite time will continue to be a variable. The commingling strains of alien blood have thus far apparently worked no deterioration of quality; they are remotely of the same stirp as our own, homogeneous and compatible. Not so the swarthy, low-browed and stunted peoples now swarming to our shores. Absorbed into the body of the people, these multitudes must inevitably evolve an inferiority of type. To realize the result of such a contingency, let it be considered that the loss of an inch in stature might bring in its train the loss of national ascendancy. Let us take care then that the State shall suffer no injury.

DO OFFICERS OF THE ARMY ON THE RETIRED LIST HOLD OFFICES?

BY GENERAL G. NORMAN LIEBER, J. A. G., U. S. ARMY.

THE following is an extract from an official report of the Judge Advocate-General, dated May 16, 1896. "I understand that it is now desired that I shall give my views with reference to the question whether a retired officer holds an office, that is, whether his position as such is an office. If so, and if the decision of the Auditor for the War Department that General Smith's position as agent of the United States is also an office be correct, then, as General Smith is a retired officer, his case would be covered by the provisions of Section 2 of the legislative, executive and judicial appropriation act of 1894. (28 Stats. 205.) This legislation is as follows :

"No person who holds an office the salary or annual compensation attached to which amounts to the sum of two thousand five hundred dollars shall be appointed to or hold any other office to which compensation is attached unless specially heretofore or hereafter specially authorized hereto by law ; but this shall not apply to retired officers of the Army and Navy whenever they may be elected to public office or whenever the President shall appoint them to office by and with the advice and consent of the Senate."

It will be at once noticed that this legislation assumes that the position of a retired officer is an office, and in this very case (of General Smith) it was so held by the Attorney-General, (Miller) in 1889, he said :

"Section 1094, Revised Statutes, includes 'the officers of the Army on the retired list' in the Army of the United States. They are therefore officers of the United States." (19 Opin. 283.)

Section 1094 also includes the enlisted men as component parts of the army, but that does not make them officers. If the reason given proves that retired officers hold offices, (and this is what the Attorney-General meant) it would prove the same with reference to the enlisted men.

Much of the misunderstanding in regard to this matter is due, I think, to the word "officer"; it being assumed that as in civil affairs a public officer is one who holds a public office, so in military affairs an officer must needs be one who holds a military office. But this is a mistake. The officer of the army who holds an office, say, of major and quartermaster, holds it by virtue of this fact itself (the office being that of major and quartermaster) and not because he belongs to the class of military men described as officers. And that is really what the word "officer" means, when used with reference to the army. For the sake of convenience, for various purposes, the army is divided into the two classes, "officers" and "soldiers" (see Sec. 1342, R. S.), but it would not be correct to say that, because we call one of these classes "officers," that means that they hold offices. They do not hold them any the more, or any the less, for being so-called; nor would they hold them any the more or any the less, if they were known by some other name. Whether or not they hold offices depends on the character of the places which they hold and not on any mere name.

Other authorities than the one mentioned have also held that the retired officer holds an office, but before examining them it will be best to consider precisely what a public office is, and whether the place of the retired officer satisfies the requirements.

In Bacon's Abridgment office is thus defined:

"An office is a right to exercise a public function or employment. * * *

"It is said that the word *officium* principally implies a duty, and in the next place the charge of such duty.

"Officers are distinguished into those which are of a public, and those which are of a private nature. And herein it is said, that every man is a public officer, who hath any duty concerning the public; and he is not the less a public officer, where his authority is confined in narrow limits; because it is the duty of his office, and the nature of that duty, which makes him a public officer, and not the extent of his authority."

According to this definition the characteristic of a public office is the performance of some duty concerning the public. In other words it is a place for the performance of public func-

tions ; public functions constitute an essential characteristic of public office ; a place to which no public functions are attached is not a public office. The authorities on this subject are so numerous that it will be impossible to examine them all, but it will not be necessary. Reference to a few of them only will, it is believed, be quite sufficient to show that the proposition is indisputable. A number of these authorities are cited by Throop in his Treatise on Law Relating to Public Officers.

"In my opinion every one who is appointed to discharge a public duty, and receives compensation, in whatever shape, from the crown or authorities, is a public officer."—Lord Chief Justice BEST.

"Offices are a right to exercise a public or private employment, and to take the fees and emoluments thereunto belonging."—BLACKSTONE.

"Offices * * * consist in a right, and a corresponding duty, to execute a public or private trust, and to take the emoluments belonging to it."—KENT.

"An office is defined to be a public charge or employment, and he who performs the duties of the office is an officer."—Chief Justice MARSHALL, in *U. S. v. Maurice*, 24 Myer's Fed., Dec., 1834.

"A public office is an agency for the State, and the person whose duty it is to perform this agency is a public officer. * * * The oath, the salary or fees are mere incidents and constitute no part of the office. Where no salary or fees are annexed to the office, it is a naked office—honorary—and is supposed to be accepted merely for the public good. This definition also excludes the idea that a public office must have continuance. It can make no difference whether there be but one act or a series of acts to be done ; whether the office expires as soon as the one act is done, or is to be held for years, or during good behavior."—Clark *vs.* Stanley, 66 N. C., 59.

"Lexicographers generally define office to mean public employment ; and I apprehend its legal meaning to be an employment on behalf of the Government in any station or public trust, not merely transient, occasional or incidental."—*In re The Oaths*, etc., 20 Johns., 492.

"Whether we look into the dictionary of our language, the

terms of politics, or the diction of common life, we find that whoever has a public charge or employment, or even a particular employment affecting the public, is said to hold or be in office."—*Bowland v. Mayor, etc.*, 83 N. Y., 372.

And it has been said that one appointed or elected in a manner prescribed by law, having a designation or title given to him by law, and exercising functions concerning the public assigned to him by law, is a public officer.—*Bradford v. Justices, etc.*, 33 Ga., 332.

Meachem, in his excellent work on Public Offices, remarks :

"The most important characteristic which distinguishes an office from an employment or contract is that the creation and conferring of an office involves a delegation to the individual of some of the sovereign functions of government, to be exercised by him for the benefit of the public ; that some portion of the sovereignty of the country, either legislative, executive or judicial, attaches, for the time being, to be exercised for the public benefit. Unless the powers conferred are of this nature, the individual is not a public officer."

And he cites a number of authorities.

"An office is a position or station in which a person is employed to perform certain duties, or by virtue of which he becomes charged with the performance of certain duties, public or private, and an officer is one who is lawfully invested with an office, and a public office is a public charge or employment imposed or conferred by appointment or authority of government and for public purposes, and public officers are officers by whom the government performs its usual political functions—its functions of government." *American and English Encyclopedia of Law*, "Public Officer" ; also citing many authorities.

And in the case of the *United States v. Hartwell* (6 Wall. 386) the Supreme Court said :

"An office is a public station or employment, conferred by the appointment of government. The term embraces the ideas of tenure, duration, emolument, and *duties*." And see *U. S. v. Germaine*, 99 U. S. 511.

The authorities are very numerous and I might cite many more, but I think enough have been cited to show that duties—functions—are an essential element of office. They are, as

Meachem says, its "most important characteristic." But they are not its only one. To cover all, a public office may be defined to be a place created by statute or by virtue of a power conferred by statute, for the purpose of the administration of public affairs, and the holder of which is appointed or elected and not employed by contract merely, and is vested with functions involving the action of some part of the political machinery (legislative, executive or judicial) of the community whose agent he is. But the most important characteristic is functions. How, then, does the place of retired officer satisfy this requirement?

Section 1255 of the Revised Statutes prescribes that officers retired from active service shall be withdrawn from command and from the line of promotion. What actually happens when an officer is retired is that he ceases to hold the office which he has held previous to his retirement, and takes a position to which no functions are attached. In *Wood v. the United States* the Court of Claims does indeed hold that an officer of the army who is transferred from the active to the retired list carries his office with him (15 Ct. Cl. 161), and it was also so held by the Supreme Court in the same case (107 U. S. 417), but if functions are an essential element of office how can this be true? Is it not, on the contrary, true that the retiring officer vacates his office and its functions, and that a successor is appointed to the office and invested with its functions? The law has created an office of Judge-Advocate General for the performance of certain duties; it has created only one such office, and it is not possible to separate the office from its duties. How then can it be said that the Judge-Advocate General on his retirement carries the office off with him?

In a recent decision the Court of Claims say: "If *duty* be an essential test of office it is not easy to see why an officer on waiting orders is not for the time being out of office." But I do not think that it is necessary to take that view. In such a case, it seems to me, nothing has happened except that the *exercise* of the functions has been temporarily suspended. There is no difficulty in that. It is not necessary for incumbents of office to be in the constant exercise of the functions of office in order not to lose it. And it seems to me that the doubt which

the Court of Claims expresses as to duty being an essential test of office is, in view of all the authorities, including the Supreme Court in the Hartwell case, quite without justification.

The decision of the Court of Claims here referred to was rendered December 2, 1895, on a motion to enter Colonel Winthrop's name as counsel in a certain case, it having in a former case been held by the same court that a retired officer was debarred by Section 5498 of the Revised Statutes from prosecuting claims against the United States. The Court of Claims quotes approvingly the following language of the Supreme Court of Texas in *Texas v. De Gress* (53 Texas, 400):

"By express enactment, officers of the army on the retired list constitute a part of the army of the United States; retain the actual rank held by them at the date of retirement; receive seventy-five per centum of the pay of that rank; are subject to trial by courts-martial for any breach of the rules and Articles of War, and may be assigned to duty at the Soldiers' Home. Rev. Stat. of U. S., secs. 1094, 1254, 1256, 1259, 1274. See *Wood v. U. S. Court of Claims*, 1880, in *The Reporter* of May 12, 1880, and 12 Opinions of Attorney-General, p. 382.

"That such an officer holds a lucrative office under authority of the United States, or, in the language of our State constitution, 'an office of profit or trust under the United States,' is too plain to admit of being made more so."

In answer to these reasons for regarding the retired officer as holding an office, it is to be remarked, first, that he is no more a part of the army than the private soldier is, and certainly the latter does not hold an office; secondly, rank is not necessarily characteristic of office—brevet rank, for example, is not evidence of office—but that rank may be an incident of office is true; thirdly, the pay of a retired officer is not a salary for present services, but a pension for past services or disabilities contracted in the line of duty; fourthly, the retired officer is for the sake of discipline made subject to the Articles of War, but no more so than the private soldier who does not hold an office; and, fifthly, the assignment to duty at the Soldiers' Home has no such significance as has been given it. Previous to the enactment of what is now Section 1259 of the Revised Statutes retired officers could not be assigned to duty of any

kind (16 Stat. 62) and this restriction was removed by the legislation contained in sections 1259 and 1260, so far as concerned assignments to duty at the Soldiers' Home and details as professors at colleges. The removal of the restriction was nothing more than permission to accept the places, and if the places are offices they are such by virtue of their own establishment and functions and not because they happen to be held by officers of the army. The position of governor of the Soldiers' Home is no doubt an office and has its appropriate functions, but the holder of that position is the holder of an office as such, and not because he is an officer of the army. It may chance that he is a retired officer, but there is nothing to be deduced from that. None of the things mentioned by the Texas court as providing that the retired officer holds an office as such does in fact bear out the claim.

In the case of the *People v. Duane* (121 N. Y. 367) the status of the retired officer with reference to the question under discussion was so well explained that I shall venture to call particular attention to it.

In 1888 General James C. Duane, a retired officer of the army, was appointed by the Mayor of the city of New York to the office of Commissioner of the New Aqueduct, under an act of the Legislature of New York, which provided that such commissioner "shall hold no other Federal, State or municipal office, except the office of Notary Public or Commissioner of Deeds." In a proceeding to test General Duane's title to the office of Commissioner of the New Aqueduct the Court of Appeals of New York (O'Brien, J.), after citing the various provisions of law relating to the status of retired officers, said:

"That the defendant held a federal office, up to the time he was retired from the service, within the meaning of the disqualifying words of the statute, is assumed by both parties to the controversy and cannot be doubted; and unless his retirement from active service, under the act of Congress, had the effect of a resignation and operated in law to vacate the office which he held prior to that time, his appointment to the office in question was without power, and he was incapable to accept it. The inquiry then is whether he held, at the time that the Mayor of New York made the appointment, the federal office

which it is admitted he held prior to his retirement on the 30th day of June, 1888. This inquiry will be aided very materially by ascertaining definitely and precisely what that office was and what relations, if any, the defendant continued to hold to it after his retirement from active service. We are informed by the agreed case that the office which he held was that of 'Chief of Engineers, United States army, with the rank of brigadier-general.' There is but one such office, and the defendant alone was Chief of Engineers and he held no other office. There is but one brigadier-general in the corps of engineers, United States army, and has been but one since 1885. It will be observed that the title brigadier-general applied to the defendant before his retirement, was used to designate not the office which he held, but his military rank and position as a member of the army. The actual office which conferred powers and imposed duties upon the defendant was that of Chief of Engineers, and unless the people can show that he continued to hold that office after his retirement from active service, this action must fail. It is within the power of the legislative department of the Federal Government to enact that military offices shall become absolutely vacant when the incumbent shall reach a certain age, and this, we think, is the effect of the legislation providing for the retirement of army officers at the age of sixty-four. The statute provides that retired officers 'shall be withdrawn from command and from the line of promotion' (§ 1255) and, in effect, that they 'shall not be assignable to any other duty.' It is difficult to conceive of the existence in this country of a military office without the power of command, the right of promotion, or the obligation to perform some duty. The statute evidently contemplated the vacation of the office by retiring army officers, and in terms produces such vacancy as completely as in cases of death or resignation. It provides that 'the vacancies consequent upon such retirement' shall be filled by promoting to the place of the officer retired the next in rank, according to the established rules of the service. There was of course, no vacancy to fill and no one could be promoted to the defendant's place, as an officer, so long as he himself held the office. This was the practical construction given to the statute not only by the Government, but by the defendant him-

self. He left the seat of government, where the duties of the office required him to be, and removed to New York, and has never since performed any of the duties.

"The President and Senate proceeded to fill the vacancy thus created by the appointment of another person to the office of Chief of Engineers, who has since performed the duties and filled it, thus actually displacing the defendant. It seems to us, therefore, that after all this, it cannot be said that the defendant continued to hold the office of Chief of Engineers, and we do not understand that the argument for the plaintiff asserts any such proposition. It is claimed, however, that he still continued to hold the office of brigadier-general. In order to adopt this proposition, we would be obliged to hold that the defendant, prior to his retirement, filled two offices, that of Chief of Engineers and that of brigadier-general, and that he has vacated the former and retained the latter. He is unquestionably entitled to wear the uniform of a brigadier-general and to assume that title, but this term is not now, and was not before his retirement, descriptive of any office which he holds or then held, but as has been observed before, of his military rank and dignity. The obvious effect of the act of Congress was to legislate the defendant out of office when he reached the age of sixty-four, securing to him out of office and in retirement, the military rank, pay and privileges which were attached to, and incidents of the office vacated. The policy was to relieve officers, approaching old age, from the duties of office and the office itself, supplying the vacant place with others next in rank, and granting to those in retirement by special enactments, the emoluments, rank and privileges enjoyed by them when incumbents of the office, in consideration of meritorious services and honorable behavior. The enjoyment, by retired army officers of these special advantages is easily confounded with the possession and enjoyment of the office itself, but they are in fact, different and distinct things. The right to the rank, uniform and pay of a brigadier-general, specially retained to the defendant on retirement by the statute, is no test of the question whether he in fact holds a federal office. The liability to trial by court-martial for offenses against the military code was assumed by the defendant when he joined the army and as his name is still retained upon the

roll, and as he is permitted to wear the uniform and receive a portion of the pay, of the rank upon which he was retired, the Government still retains some control over his conduct, and while relieving him from office, has retained this liability. A person may, of course, be subject to the rules and Articles of War, and to trial by court-martial, without, necessarily, holding a federal office. He is liable to be assigned to duty at the Soldiers' Home, if selected for that purpose, by the commissioners of that institution, and this selection is approved by the Secretary of War. Such appointment and approval might, and probably would, confer upon the appointee the character of a federal officer, but until that is done, it cannot be said that this liability is any proper test of the question under consideration, and this is also true in regard to the provision permitting a retired officer to be detailed, on his own application, to serve as professor in any college. It is suggested that as defendant is still a member of the army, as constituted by the federal statutes, he is, for that reason, subject to be assigned to duty by the President and Congress. That may be so, and when such assignment is made he may then hold a federal office not held by him when the mayor made the appointment in question.

"A public office has been defined by this court to be 'a permanent trust to be exercised in behalf of the Government or all citizens who may need the intervention of a public functionary or officer. * * * It means the right to exercise generally, and in all proper cases, the functions of a public trust or employment, and to receive the fees and emoluments belonging to it, and to hold the place and perform the duty for the term and by the tenure prescribed by law.' (*In re Hathaway*, 71 N. Y. 238.) And by the Supreme Court of the United States as a public station or employment conferred by the appointment of Government; and embraces the ideas of tenure, duration, emoluments and duties.' (*U. S. v. Hartwell*, 6 Wall. 385; *U. S. v. Germaine*, 99 U. S. 508.) Neither of these definitions, we think, apply to the defendant, after his retirement, and at the time the appointment in question was made, and we can find nothing in the circumstances that he was entitled, under the act of Congress, to certain rights and privileges and subject to the rules and Articles of War, that brings the case within the

policy of the disqualifying clause of the statute, whether that policy was to secure to the statute under the authority of which the appointment was made, the benefit of his undivided time and talents or to guard against the influences to which the occupancy of a federal office might subject him. The decisions cited from the Court of Claims and the United States Supreme Court (*U. S. v. Tyler*, 105 U. S. 244), hold that retired officers are in the military service of the United States in the sense that they are entitled to what is known as longevity pay. That proposition may be, and is, conceded, but it does not prove that such a privilege secured by special statute in the nature of compensation for years of past faithful service makes the beneficiary the incumbent of a federal office. The case of the State *v. De Gress* (53 Tex. 387) certainly does hold that an army officer on the retired list holds a federal office within the meaning of a statute of that State, similar to the provision contained in Chapter 584 of the Laws of 1888. That conclusion was reached, however, by assuming that such a result must necessarily follow from the federal decisions holding that he is in the military service and a member of the army, considerations which we think, do not control the question. The defendant did not, in our opinion, hold a federal office, when appointed by the mayor, within the meaning of the statute, and the judgment of the courts below in his favor should be affirmed." (121 N. Y. 367, 372.)

To my mind this opinion is convincing, but the Court of Claims in the decision already referred to (on Colonel Winthrop's motion) does not agree with it. The court was in fact already strongly committed to a different view. This was first announced in the case of *Wood v. United States* (15 Ct. Cl. 151), in which the court took the position which was subsequently confirmed by the Supreme Court (107 U. S. 417) in the following language :

"The view of that court (Court of Claims) was * * * that, by Sec. 1094, the officers of the army on the retired list are a part of the army of the United States, and, therefore, no one can be upon that list who is not an officer appointed in the manner required by Sec. 2 of Art. 2 of the Constitution ; that an officer of any grade, on the active list, thus appointed, may be

retired with a different rank from that which belongs to his office, when Congress so provides; that this is not to appoint him to a new and different office, but is to transfer him to the retired list, and to change his rank, while he holds the same office; and that in connection with this change of rank his pay may be changed. These views appear to us to be sound."

In *Tyler's case* (16 Ct. Cl. 223), affirmed by the Supreme Court (105 U. S. 244) and cited by the Court of Claims in its ruling on *Winthrop's motion*, the question was not whether retired officers hold offices but whether they are in the "service," within the meaning of the laws relating to longevity pay. So that that case has no application to the present question.

In the case of *Badeau v. United States* (130 U. S. 439) the Supreme Court seem to hold the opinion that the place of the retired officer is an office, but referring to this and *Duane's case* Mr. Attorney-General Olney has said (XX Opin. 686):

"The Court of Appeals of the State of New York has held in a forcible and elaborate judgment that a retired army officer, unless and until assigned to duty at the Soldiers' Home, does not hold an office within the meaning of that word as used in Section 1763 of the Revised Statutes. This proposition does not seem to have been argued, or, if argued, not to have been considered by the Supreme Court of the United States in its decision in the *Badeau case*."

This suggestion is perhaps equally applicable to the *Wood case* (107 U. S. 417). Certainly there is no evidence to be found in the report of this case of the attention of the Supreme Court being given to the question whether, measured by the standard fixed by the authorities and especially by itself in the *Hartwell case*, the place held by the retired officer is in fact an office. In that case the court held that an essential element of office is "duties," but in the *Wood case* this is not considered. Moreover, the actual question in this case was not whether the retired officer holds an office but whether after having once been placed on the retired list with a certain rank and pay these can be changed by legislation.

In addition to the authorities referred to, it may be mentioned that Mr. Second Comptroller Mansur, in a decision dated February 24, 1894, also took the view that the retired officer holds an

office. He bases his opinion on the authorities cited—the Wood, Tyler and De Gress cases. I am led after a careful consideration of this matter to a different conclusion, and in this I am but following the views of the War Department, as thus announced in paragraph 8 of the Army Regulations :

“Rank is generally held by virtue of office in a regiment, corps, or department, but may be conferred independently of office, as in the case of retired officers and of those holding it by brevet.”

Retired officers are, in fact, pensioners. The position and pay given them constitute a form of pension. They exercise no public functions and receive no emoluments of office, but are given a pecuniary reward for past faithful services or disabilities contracted in the line of duty. The place which they hold does not possess what Meachem calls the “most important characteristic” of an office, and what the Supreme Court has declared to be one of its essential elements.

If my views be correct, it follows that Section 2 of the legislative, executive and judicial appropriation act of 1894 does not apply to General Smith's case, even if it should be held that his place as agent of the United States under the engineer department of the army is an office, which, for the reasons stated in my accompanying memorandum, I doubt. As I understand it, a public office is either created directly by legislation, or pursuant to legislation, or is recognized by legislation. I do not understand that an executive officer can create a public office without some authority of legislation, and there seems to be none in this case.

MILITARY DEPARTMENT IN OUR SCHOOLS AND COLLEGES.

BY CAPTAIN JAMES REGAN, 9TH U. S. INFANTRY.

I. ITS ESTABLISHMENT.

THE idea, which dates back to the ancients, of teaching the boys and young men in schools and colleges the rudimentary part of the Art of War, is a most excellent one and deserves every encouragement. "Nothing," says the Inspector General, "can be more important than the instruction of freemen in the wisest way to defend their country," and in its enforcement, the principle "in time of peace prepare for war" finds its most intelligent application. Its purpose is patriotic, as the law providing for military instruction in our colleges had its origin in 1866, based upon our experience in the Civil War, which clearly demonstrated the great importance of giving to the young men of the country such a knowledge of military tactics as will enable them to take an active and efficient part in the future wars of the country. For the spread of military knowledge throughout the land much is due to the veterans of the Civil War. The national flag, through their efforts, is now seen and venerated daily by the school children in every hamlet and village. They have taken to heart the words of General Sherman: "I cannot help plead to my countrymen, at every opportunity, to cherish all that is manly and noble in the military profession, because peace is enervating and no man is wise enough to foretell when soldiers may be in demand again."

The policy of thus imparting military instruction, theoretically and practically, has already produced marked results in preparing young men to take important positions in the National Guard, and in giving to them a marked military bearing, *i. e.*, head erect with the natural swing of the arms and legs. How disappointing it is to see young men, yet in their teens, hollow chested and round shouldered! These defects are now closely observed in the schools, and corrected on the spot, one of our inspectors recently reporting that he found the cadets "straight,

square shouldered, receptive and alert." The Inspector General, in his report for this year, also bears testimony to this fact, he states that "the students exhibit a marked aptitude for military instruction, and evince much interest in the various drill exercises." The Military Department, so far, is giving entire satisfaction to teachers and faculty, who, be it said to their credit, are giving it loyal support. It would indeed be strange if they were not alive to its merits and advantages. It is needless to remark that the Government is no loser by the efforts it puts forth towards sustaining these institutions. Had this system been in vogue before the Civil War, we would have had a splendid nucleus upon which to form our armies. The material in tens of thousands of trained and intelligent manhood is now at hand, and increasing every year, to spring to arms at the first call of the President. In this connection the following from the Report of the Inspector General is pertinent: "One of the oldest colleges, whose military department was established as early as 1819, is said to have furnished, from its alumni for the Civil War, 12 general officers, 25 colonels, 40 field officers and 198 company officers, or a total of 275 commissioned officers." What stronger argument do we desire than that which this piece of history buried in the public archives presents?

The Military Department in its early developments had many discouraging circumstances to contend against. The innovation was thought to be too radical, and in some quarters met with decided opposition, many believing that the time devoted to military instruction would be so much time lost to college pursuits. Besides, there were a few who did not want the military idea too strongly developed in their sons. But happily the days of doubt have passed. The Inspector General, in his report of 1892, gives apt expression to this idea, in these words: "How unsuccessful, almost discreditable, the military instruction at some of our earlier institutions was, and how thriving and progressive most of them have now become, is sufficiently shown in the reports from year to year." That every year shows a marked increase in the popularity of the military feature is demonstrated by the following figures:

The reports of 1892 showed 10,257 students under instruction in the Military Department. Fifty per cent. increase, nearly,

over the previous years, and over fifty per cent. of the aggregate attendance of students at the schools inspected.

At the close of the year 1894-95 there were 104 schools and colleges at which military instruction was given by officers of the army to 19,546 pupils, an increase of nearly 3000 over the number of the previous year.

The number of pupils at schools and colleges receiving military instruction from officers of the army has more than doubled within the last four years. * * * The students attending schools and colleges at which military instruction was regularly imparted during the year numbered 35,638, of whom 26,723 were capable of military duty.

In 1891 the pupils receiving military instruction averaged 134 per college; in 1893 the average was 188.

Since the value of military training has been so decidedly recognized by the authorities of educational institutions and duly appreciated by the students, our officers detailed on these duties now exercise the same rights and privileges as are accorded to the professors in the non-military departments, being, perhaps without exception, members of the faculty.

The Government has and is doing everything in its power to foster a proper military spirit, and that it is meeting with success is evident from the preceding figures. Perhaps in the near future there may be ways and means devised by the Government to furnish to the Military Department at cost the necessary uniforms, and such other articles as may be necessary to its efficiency. In fact the matter has already been referred to in Congress. The Government has been steadily adding to the number of officers for detail to educational institutions. The 30 originally allowed being increased to 50, then 75, and by laws on the subject quoted below, to 100; the annual report of the Secretary of War for the year 1893, showing 99 officers on this duty. (Published in G. O. 93, '93.) In this connection, attention is called to the laws now applicable to the detail of officers, to wit:

Sec. 1225 Revised Statutes (as amended by act approved Sept. 26, 1888). The President may, upon the application of any established military institute, seminary or academy, college or university, within the United States, having capacity to edu-

cate at the same time not less than one hundred and fifty male students, detail an officer of the army or navy to act as superintendent, or professor thereof; but the number of officers so detailed shall not exceed fifty from the army, and ten from the navy, being a maximum of sixty, at any time, and they shall be apportioned through the United States, first, to those State institutions applying for such detail that are required to provide instruction in military tactics under the provisions of the act of Congress of July second, 1862, donating lands for the establishment of colleges where the leading object shall be the practical instruction of the industrial classes in agriculture and the mechanic arts, including military tactics; and after that, said details to be distributed, as nearly as may be practicable, according to population. The Secretary of War is authorized to issue, at his discretion and under proper regulations to be prescribed by him, out of ordnance and ordnance stores belonging to the Government, and which can be spared for that purpose, such number of the same as may appear to be required for military instruction and practice by the students of any college or university under the provision of this section, and the Secretary shall require a bond in each case, in double the value of the property, for the care and safe keeping of the same, and for the return of the same when required; provided, that nothing in this act shall be so construed as to prevent the detail of officers of the Engineer Corps of the navy as professors in scientific schools or colleges as now provided by act of Congress, approved February 26, 1879, entitled "An act to promote the knowledge of steam engineering and iron ship building among the students of the scientific schools or colleges of the United States"; and the Secretary of War is hereby authorized to issue ordnance and ordnance stores belonging to the Government on the terms and conditions hereinbefore provided to any college or university at which a retired officer of the army may be assigned as provided by Section 1260 of the Revised Statutes.

The above was amended so as to allow the President to detail, under the provisions of said act, not to exceed 75 officers of the Army of the United States; "and the maximum number of officers of the army and navy to be detailed at any one time under the provisions of the act passed Sept. 26, 1888, amending

said section 1225 of the Revised Statutes, is hereby increased to 85. Provided, That no officer shall be detailed to, or maintained at any of the educational institutions mentioned in said act where instruction in drill and military tactics are not given; Provided further, that nothing in this act shall be so construed as to prevent the detail of officers of the Engineer Corps of the navy as professors in scientific schools or colleges as now provided by act of Congress, Feb. 26, 1879." (Approved Jan. 13, 1891.)

Also further amended, so as to permit the President to detail under the provisions of said act not to exceed 100 officers of the Army of the United States; "and no officer shall be thus detailed who has not had 5 years' service in the army and no detail to such duty shall extend for more than four years and officers on the retired list of the army may upon their own application be detailed to such duty and when so detailed shall receive the full pay of their rank; and the maximum number of officers of the army and navy to be detailed at any one time under the provisions of the act approved Jan. 13, 1891, amending section 1225 of the Revised Statutes as amended by act approved Sept. 26, 1888, is hereby increased to 110." (Approved Nov. 3, 1893.)

In this last act the limited number includes retired officers.

The following apportionment in accordance with the laws quoted and the census of 1890, having been approved by the Secretary of War and the Navy, details of officers are made in accordance therewith. (See page 80.)

Any institution making application formally through the Secretary of War, is required to furnish the following data: (1.) Last printed catalogue; (2.) A certificate as to the number of male students the institution has, the capacity of buildings, apparatus, and instructors to educate at one and the same time; (3.) The number of such students in actual attendance at the time of the application, or if the application be made during vacation, the number actually in attendance during the session immediately preceding it; and (4.) The number of fifteen years of age: the certificate should also show the grade of the institution; the degrees it confers, and whether or not it is a land grant school. (See G. O. 93, 1893, A. G. O.)

Under present orders it is held where a State has more than

APPORTIONMENT.

STATES.	Population of States arranged in groups.	Population of States and States not arranged in groups.	Details due.		
			Land gr., Schools.	By Population.	Total.
Maine	661,086		I		
New Hampshire	376,530		I		
Vermont	332,422		I		
Massachusetts	2,338,943	4,700,745	I	5	11
Rhode Island	345,506		I		
Connecticut	746,258		I		
New York	5,997,853		I		
New Jersey	1,444,933	7,442,786	I	8	10
Pennsylvania	5,258,014		I		
Delaware	168,493	5,426,507	I	6	8
Maryland	1,042,390		I		
District of Columbia	230,392				
Virginia	1,655,980	3,691,556	I	4	7
West Virginia	762,794		I		
North Carolina	1,617,947		I		
South Carolina	1,151,149	2,769,096	I	3	5
Georgia		1,837,353	I	2	3
Alabama	1,513,017		I		
Florida	391,422	1,904,439	I	2	4
Mississippi		1,289,600	I	1	2
Louisiana		1,118,587	I	1	2
Arkansas		1,128,179	I	1	2
Tennessee		1,767,518	I	2	3
Kentucky		1,858,635	I	2	3
Ohio		3,673,316	I	4	5
Indiana		2,192,404	I	2	3
Illinois		3,826,351	I	4	5
Michigan	2,093,889		I		
Wisconsin	1,686,880	3,780,769	I	4	6
Missouri		2,679,184	I	3	4
Minnesota	1,301,826		I		
North Dakota	182,719	1,813,353	I	2	5
South Dakota	328,808		I		
Iowa		1,911,896	I	2	3
Nebraska		1,058,910	I	1	2
Kansas	1,427,096		I		
Oklahoma	61,834	3,724,453	I	4	6
Texas	2,235,523		I		
Montana	132,159		I		
Idaho	84,385		I		
Wyoming	60,705		I		
Colorado	412,198	1,110,565	I	1	5
Utah	207,905				
New Mexico	153,593				
Arizona	59,620				
Washington	349,390		I		
Oregon	313,767		I		
California	1,208,130	1,917,048	I	2	6
Nevada	45,761		I		
Total			44	66	110

one school endowed by the National land grant, under the act approved July 2, 1862, the school which is reported by the Governor of the State as most nearly meeting the requirements of existing laws, that such school has first claim to the officer allotted to the State for detail at a land grant college.

An officer is privileged to make application to the Adjutant General through military channels, to be detailed at colleges, universities, etc.

It is a fact borne out by the official records of the War Department, which redounds to the credit of the army, that the officers who have and are performing this important duty, have acquitted themselves with marked distinction. They have shown excellent judgment, management, tact, and skill, gaining with hardly an exception the approbation of both students and instructors.

The military course, with but few exceptions, is made compulsory in one or more classes. Statistics show that excellent results have been obtained; (1) Where all the classes take the military course, or it is compulsory on all male students, who are not declared to be disqualified for such exertion by some competent medical man—in the latter event a theoretical course should be enforced; (2) When the military course is carried through three years, especially in the case of those appointed officers, because by the time these reach the senior class they become capable officers, besides tending to the acquisition of a spirit of obedience and promptness. Of course it is recognized to be next to impossible to fix such conditions by an inflexible rule; but it does seem practicable for the Government and the various institutions to come to some definite understanding upon this subject. Notwithstanding the excellence of the military departments in our schools and colleges there are many details to be modified and added to obtain the best results; attention has been called to them by our inspectors, and they are here but briefly referred to:

1.—The student in the military departments should be placed on an equal footing with students in other departments, and be allowed the same weight and credits in class standing, otherwise, as remarked by the Inspector General, the military cadets are at a double disadvantage as regards class standing,

i. e., no credit and loss of time, a serious loss in competition with other students not enrolled.

2.—To meet tactical requirements, ground for drills and ceremonies should be provided, and upon these grounds, in an appropriate and conspicuous place should be erected a suitable flag-staff, for the national flag, which should be hoisted and lowered in the manner prescribed for military stations. This would have the effect of instilling into the cadets a proper respect for "Old Glory." For the winter drills and exercises a suitable hall or gymnasium should be provided, this would do away with the unsatisfactory makeshifts which now pertain at many institutions; rifle ranges should when practicable be also provided.

3.—The library of each institution should be supplied with a fair assortment of military works in rapport with the times, and based upon Regular Army practice. This would do away with the necessity, which has pertained in the past, of using antiquated drill books. A much felt necessity is a practical textbook containing in sufficient detail a suitable course of military instruction.

4.—The necessary "Ordnance and Ordnance Stores" in the way of field-pieces, arms, and accoutrements, should always be kept on hand to meet fully the requirements of the institutions, and in mechanism and the other essentials should be up to date, in a word, modern, and not as they have been in the past, in many cases ancient, worn-out, and, of course, valueless. To meet these requirements fully, these articles should, as they are now in part, be supplied by the United States, and the rules for obtaining them should be as free from circumlocution as it is possible to have them. As the Government must bear most of the expense for the care of these stores, it has been suggested that a retired non-commissioned officer or private be detailed for this purpose as an assistant to the military professor. This is not an exorbitant idea, in view of the fact that fully 10,000 young men are yearly graduated from our institutions who have gone through the military course to be in touch with the masses. It must be evident that expenditures cannot be made more effective for success in war than in thus perfecting the Military Department.

Of course it is well understood that it is not the direct aim of our educational institutions to train soldiers, but, as it has been ably remarked, "to cultivate those qualities of the true soldier, which are the distinguishing traits of character revealed in the true gentleman and the capable man of affairs. This, it is believed, can be more fully attained by the addition of military discipline, the aim of which is to inculcate high-minded and noble sentiments, truthfulness, honor, and candor; in a word, true manhood."

II.—DUTIES OF THE MILITARY PROFESSOR.

The rules for the guidance of officers are few and simple, and the military curriculum must necessarily be of the simplest character, graded, of course, from the primary or grammar school up to the university. These officers are charged with the discipline of the cadets, and must reside at or near the institution to which assigned, and while in the performance of duty must appear in their proper uniform. The students or cadets, upon occasion of military ceremony, in the execution of drills, guard duty and when other instruction of a military character is being imparted, must always be required to appear in the uniform prescribed by the institution. In their relations to the institutions, officers are required to observe the general usages and regulations of other members of the faculty. In addition to their strictly military duties, they may, for their own benefit and for such compensation as may be agreed upon, perform other duties in connection with the institutions. For example, for teaching any branch of study, as mathematics, French, etc., or when the officer is also commandant and charged with the entire discipline of the cadets and the preparation of demerit lists. By the Inspector General's report of 1893, it is shown that, out of a total of 79 institutions, this extra compensation has ranged from \$300 to \$2100 per annum.

One of the most important duties of the officer detailed for this duty is to enforce proper discipline (military) at all times when the cadet students are under military instruction. Discipline is of paramount importance. It means simply duty well performed. "Military obedience is noble, for it is enjoined by devotion, and devotion reaches, in case of need, even to the

sacrifice of life." "Obedience in all its length and breadth, and devotion in all its height, characterizes the ideal military spirit." The real purpose of the Military Department is to make our young men trained patriots, and they should be taught that "patriotism enjoins that all things should be sought for which increases its power, and all those things shunned which enfeeble it."

Passive and unhesitating obedience should be the rule. "Under arms, the law is the command of the responsible chief, as the country is the flag." "This rule governs in Republican America no less than in the armies of Imperial Germany and of Autocratic Russia"; it has been the rule in all armies, ancient and modern, and by it young America must be guided. The command to hold a position at all hazard means, if need be, to die at one's post.

The discipline of the students in the past, after careful observation, has with but few exceptions been highly commended by our inspectors, due largely to the requirements that all rules and orders relating to the organization and government of the military students, the appointment, promotion and changes of officers, and all other orders affecting the Military Department, except those relating to routine duty, shall be made and promulgated by the professor of military science and tactics, after approval by the president or other administrative officer of the institution.

Individuality is now prominently recognized in modern tactics, especially in this the case in subordinate commanders. The importance then of every one understanding his duties must be apparent. The squad and the section have become important units in the time of battle, therefore, as these minor commands are efficient or deficient, so will be the company, and so will be the army itself on the day of battle. The greatest care should, therefore, be exercised by the military professor, and under him his officers, in preparing the cadets for the squads and the squads for the company. Owing to the limited time devoted to the acquisition of military knowledge, the varied capacities of the cadets and deficiencies in adequate means and facilities at institutions, it seems next to impossible to adopt an uniform system of regulations and discipline; a graded system, however,

should be prepared, thereby doing away with uncertainty and individual whims. Under present conditions all that can be successfully attempted is to teach the cadets how to command the company, which involves a great deal of knowledge of details, and, if time permits, to take them through the battalion, and to accomplish this much they must progress rapidly. The minor operations of war should be, if it at all, but lightly touched upon. If the cadet upon his graduation is capable of organizing from the masses a company or a battalion he is a valuable citizen; take a retrospect and you can imagine how valuable he might have been at the firing of the hostile guns at Sumter.

The position of the Germans to-day is the result of practical military training, backed by the development of general intelligence. The practical is of paramount importance. A story often cited illustrative of this is told of a young man who greatly distinguished himself in battle, and in consequence was ordered up for examination for a commission, and was reported against on account of lack of educational attainments. President Lincoln when the matter was brought to his attention remarked, "It seems that this young man does not know the technical names of the work which he had horse sense to capture, but a little more horse sense is very much needed in the army just now." It is needless to remark that the young man got his commission.

The training for the students cannot be what it is in the army, nor at West Point. It must be a happy medium between the two. The training at West Point, apart from the educational idea, is what gives to it its peculiar character. Its system of rules and regulations of a disciplinary character, which are carefully and rigidly enforced, is what makes men "out of our city and country bred boys." By this system the cadet has the minutest detail of the routine of his daily life prescribed: he rises, studies, eats, exercises, and retires by rule or regulation. The life of the cadet is nearly that of the soldier, with the educational branch added. A modification of this system is what is wanted for our schools and colleges, as its effect would be to induce habits of order and obedience, and necessarily higher percentage of studies.

In order to teach the cadets habits of neatness, order, self-

reliance, and subordination to authority, proper rules should be instituted, and firmly but kindly enforced; consistency is a jewel. They should be required to make their own beds, sweep out their rooms, and should get them in order the first thing in the morning and keep them so during the day, so as to be in readiness for inspection at a moment's notice. Everything should be done with military promptness and decision. Their duties and the duration of the same should be defined and duly promulgated. Take, for example, the list of duties at a military post, and base a list upon the same principle to meet the peculiar conditions of the institutions.

Of course it is fully recognized that the training in our schools and colleges cannot be as nearly perfect as it should be owing to the limited time devoted to military study and exercises, about three hours per week; but undoubtedly it has the effect of giving to our young men better physiques, a more correct carriage, and habits of obedience, self-control and respect for superiors, and its importance is recognized by both parents and students, because the institutions noted for the excellency of their Military Department show the largest attendance.

REWARDS AND PUNISHMENTS.

Every inducement possible to well doing should be held out to the cadets, and the military professor should be loyally and consistently supported in all that his position requires in the line of duty. A simple system of rewards and punishments should be, and is for that matter, enforced in every institution.

Rewards.—Merit should be becomingly noticed, not in the blare of trumpets but by some lasting testimonial. This in a measure now pertains in giving commissions to officers and warrants to non-commissioned officers. Those on the merit roll should be published at stated periods in orders. As an additional incentive, the professor of military science and tactics is, on the graduation of every class required to obtain from the president of the college the names of such students belonging to the graduating class, who have shown special aptitude for military service; and to report the same to the Adjutant General of the Army, furnishing a copy thereof to the Adjutant General of the State for his information. The names of the

three most distinguished students in military science and tactics of each college are, when graduated, entered in the United States Army Register. But irrespective of rewards their military training qualifies them to take leading places in the National Guard of their respective States, and also in the event of war to take a leading part and distinguish themselves in the service of their country.

Punishments.—The system of demerits or punishments is prescribed by the president or faculty of the institution, and is as varied in detail as the number of our military institutions, ranging from a deprivation of a recreation to expulsion. I shall cite a few of the punishments here to show their character; a complete list of offenses is kept, with a fixed number of demerits for each offense, which are variously marked in the different institutions, for example :—

1. For an unauthorized absence, 3 demerits and 3 confinements or four tours of extra duty for each offense.

2.—A fixed number of confinements in light prison, in room.

3.—Suspension of privileges and reduction of officers, and non-commissioned officers to the ranks by commandant.

4.—Cases of serious breaches of discipline, or misconduct are reported to the proper authorities of the institution according to established methods. For example, the officer reports to the regent, the offender is notified of it; for another offense in the same year he is again notified, also his parents, second warning; for a third offense the culprit is summoned before the faculty for reproof, notice of same being sent to parents, third warning. If he is again called before the faculty he is liable to suspension and expulsion.

III. ORGANIZATION.

Organization in the military sense depends largely on the size of the college or school and the number of students for military duty. The most prevalent organization is that of the battalion of two companies, which tactically should not exceed four. In the Inspector General's Report of 1892 it is shown that one college has a regiment of ten companies, another of two battalions of three companies each, and several of the smaller colleges but one company each. In addition to the infantry organization, a

number of the colleges have an artillery detachment or platoon ; and in one case a cavalry detachment, band and drum corps are sustained at a few of the colleges.

The size of the company depends upon the number of students available for the military duty. Whatever the organization may be, cavalry, artillery, or infantry, it should strictly conform to that adopted by the general government, in a word, the student soldiers should be up with the times. It must be borne in mind that an entire nation, owing to the advanced state of the art of war may be annihilated or crushed, if it cannot bring to its defense a sufficient number of trained soldiers and effective arms. This fact has had much to do with the organization of the Military Department in our institutions. The elementary instruction of the cadet should receive the closest attention, because we want the spirit as well as the appearance of the soldier.

APPOINTMENT AND PROMOTION.

The practice of appointing or promoting officers and non-commissioned officers varies in the different institutions, but as a general rule it is done by the president, or it is based upon fixed rules, upon the recommendation of the commandant. The officers are selected from the seniors, and the non-commissioned officers from the juniors and sophomores, the corporals sometimes from the freshmen, such selections being based upon length of service and class standing, general fitness being also taken into consideration, as military bearing, faithful performance of duty, and exemplary deportment. To test the capacity of privates for the duties of non-commissioned officers, a resort to the service rule of appointing them lance corporals might be advisable, to be retained in such grade only a reasonable time, from three to six months.

The selection of officers from the higher classes, or the most experienced, has had a salutary influence over the rank and file. In a limited number of States, commissions, as brevet second lieutenants are issued to the cadets by the Governors of the States. This fostering care or State recognition is admirable and must, in time, result in a high *esprit de corps*, as the holders of such documents, based upon merit, must feel highly honored, and should be respected accordingly. The following are

a few illustrations of the rules adopted in appointments and promotions :

1. To be eligible for corporal there must be obtained two term credits in class-room and two in drill practice.
2. For sergeant three term credits in each.
3. For lieutenants and captains six term credits in each.
- 2d. Promotion is based upon fitness, determined by examination, to wit.

For corporals, school of the soldier, extended order, and guard duty.

For sergeants. School of the soldier and duties as guides.

For lieutenants. The same as sergeants with the addition of the company and ceremonies.

For captains. The same as lieutenants, with the addition of the battalion and ceremonies.

The system of marking varies; in one case 100 is the maximum for every drill, 75 being unsatisfactory. In another case the marking is as follows :

Attention, 200 ; Discipline, 200 ; Minor Tactics, 200 ; Infantry Drill, 300 ; Marksmanship, 100 (this latter is too low, as the value of the soldier is largely determined by his skill with the rifle) ; Camping and Practice Marching, Military Signaling, 100 ; Artillery Drill, 100. Evidently the man who devised this system was an infantry officer.

Competitive examinations are also resorted to, the questions being selected from the subjects studied. Any of the numerous systems in vogue for marking will answer equally as well as those cited, merit being the only test. The appointments or promotion thus decided should be published in orders, to the cadet corps, following the army form, to wit :

HEADQUARTERS.

GENERAL ORDERS.

No.

Upon the recommendation of is hereby appointed Corporal from this date. He will be obeyed and respected accordingly.

BY ORDER OF.

(Sgd).

Adjutant.

The organization of the company for war, or as it has its daily existence in our army, comprehends a great deal more than the listing and drilling an organization of boys. This remark is made in all kindness and it is made more to point the difference. As our institutions should closely follow army methods, the following will show generally what the real organization for service is, and for the citizen it ought to be instructive.

1. The first thing is to secure the men to form the squads and then the company, which is done by recruitment in the centres of population, usually in the large cities, but during our Civil War they came as well from the farms and hamlets. Recruitment in itself would make a voluminous essay, but the procedure is simple enough. The officer with his party of two or three bright alert soldiers locates his office or rendezvous in a place which he considers a desirable locality, hangs the National colors on the outer wall, conspicuously displays his posters, perhaps with the aid of the local bill poster, and with his office in order and *Triplers' Manual* at his elbow, he is prepared for all comers—in a word, business. The men offering themselves for enlistment are subject to a severe physical examination, and if satisfactory take the oath of allegiance and become soldiers, for the real purport of which refer to the enlistment papers and to the Articles of War, where for certain crimes the death penalty is often mentioned. The men thus enlisted are sent to depots to be organized into squads, then into companies, and are thoroughly drilled and disciplined. In time of peace they are sent directly to their post or station.

2. Suppose, as above indicated, the men enlisted are sent, as they were during our Civil War, directly to depots, in a short time a large number of recruits unorganized will have assembled. The commanders of such depots are usually charged with their organization into companies, and, perhaps, battalions and regiments, and with all the details incident thereto, as muster in, etc. The enlistment papers are forwarded to these commanders, and are the basis for organization, the officers being appointed by the President of the United States or the Governors of States. The enrollment rolls, or as in the army the assignment rolls, or descriptive lists, are handed to the captain or the commander of

the company, and the latter is now in a position to arrange and conduct the administration of the company, including the selection and appointment of his non-commissioned officers, if they have not already been appointed.

3 The company organization effected, the captain is the important man, as he becomes responsible for the theoretical and practical instruction of his officers and non-commissioned officers. With this very important element of the company thoroughly efficient, it becomes a very easy matter for the captain to take the company through its courses, the individual instruction, the squad, and the company, efficient companies making efficient battalions, and so of the higher units until the army corps or army is reached. The organization of the land forces of the United States is readily ascertained by a reference to the organization table in the latest Army Register.

EQUIPMENTS.

Uniforms.—Taking into account the number of our military institutions, it is next to impossible to fix and prescribe the uniform, its color and facings, and cut or fashion; but it is important in the interest of discipline and a proper *esprit de corps* that the uniform of the cadets should be neat and well fitting. The rank and distinctions of arm of service, etc., should be the same as in our army, with the State coat of arms as in the National Guards. Once the uniform is adopted, it should be published in the way of an order or regulation, taking as a model army methods. Have the following as the first paragraph of the order, to wit:

No officer or cadet of ——— shall wear any other than the prescribed uniform, when on duty. Then follow with the different parts of the uniform.

The uniforms now worn, in the matter of color, cut and fashion, is a matter of taste, the color preferred being equally divided between the blue and the gray, in a few cases a combination of both. Whatever it may be it should be complete and as the word indicates uniform in every detail. White gloves should be a part of the uniform.

When the cadet organization carry flags, the national colors should have the preference over college or State standards, but

where it is practicable the college or State standard may also be carried on the left of the National colors, as the regimental standard is now carried in regiments.

Ordnance and Ordnance Stores.—For their issue and the rules pertaining thereto see G. O. 93 of 1893, War Department.

IV. INSPECTIONS BY REGULAR INSPECTORS.

Under the rules prescribed by the President of the United States, the Military Department of our colleges, universities, and other educational institutions is subject to inspection at any time, but usually at the close of the college year. The Inspector upon his arrival at an institution reports to the president, or other administrative officer, to obtain from him the necessary facilities for the performance of his duty. A copy of his report of such inspection is furnished to the president of the institution by the Secretary of War.

The questions, which are numerous and minute, are furnished in advance to the officers detailed at institutions to be answered and delivered to the Inspector upon his arrival. (See official form.)

V. COURSE OF INSTRUCTION.

This in general terms is prescribed in orders, from the War Department, being both practical and theoretical. These studies must be so arranged that two hours shall be devoted to the former and one to the latter, which is the minimum, much more time being given in many institutions, to the Military Department. The primary object of the Government in thus encouraging military studies is, as already incidentally referred to, to prepare our young men and through them the citizens of our country in military organization and the simple or primary duties of the soldier, the importance of which must be perceived when the smallness of our standing army is taken into consideration. Much will depend in future as in the past upon our citizen soldiers, whose past record is replete with glory. We must look to them and must, therefore, have them ready for the formation of our grand armies. Mobilization and concentration now-a-days is of the greatest importance, the skill of the Germans in these two particulars beat the Austrians and French respectively in 1866, and 1870.

Under the conditions which prevail in this country, largely due to the old soldiers of the late war, and patriotism, military instruction and discipline is no longer confined to select schools, but very properly begins in the primary or grammar schools, thence through the high schools into the universities, and let it be hoped that in this laudable effort to make our young men perfect soldiers, we shall also succeed in making them perfect men, physically, intellectually, and morally.

The simple parts of the art of war, which is all that should be attempted, are not difficult to master when practice is combined with theory, backed by the skill, tact and common sense of our officers on this duty. Military studies should be graded to be in rapport with the different characters of our schools.

Before treating in detail the gradations of military study which is considered appropriate to the different schools, I shall point out what the Department of War expects and has prescribed, to wit:

I. THE PRACTICAL COURSE.

1.—Infantry—Embraces: Small-arm target practice, and as far as possible, all the movements prescribed in the drill regulations of the United States Army, applicable to the battalion:

2.—Artillery—Embraces, as far as practicable, such parts of the United States drill regulations as pertain: (1) to the formation of detachments—manual of the piece: (2) mechanical manœuvres: (3) aiming drill: (4) sabre exercise: (5) target practice.

3.—It should also include the duty of sentinels, and where practicable, castrametation.

It is required that these instructions shall be given personally by the military professor, or under his immediate supervision.

As the development of the physical man is an important feature of the Military Department, the setting up drill or exercises should receive special attention, being a great benefit to young men.

2. THEORETICAL INSTRUCTION.

This embraces recitations and lectures personally conducted and given by the military professor. The course must be, as

far as practicable, systematic and progressive in the following subjects: The drill regulations of the United States Army; the preparations of the usual reports and returns pertaining to the company, the organization and administration of the United States Army, and the elementary principles governing the art of war.

To best illustrate how these provisions have in the past been interpreted and carried out in our institutions, the following citations from official reports are here presented:

1.—The practical part during a year:

Battalion drills from 0 to 33.

Company drills from 2 to 3 per week, the former being over the average.

Cavalry drills are only attempted in one or two colleges.

The ceremonies are spasmodic and rare.

The duties of sentinels, target practice, marching, and camping touch zero.

The average time devoted to practical work per annum is much below the two hours indicated by the War Department.

2.—The theoretical work during the year.

1.—Recitations in class room in drill regulations, guard duty and perhaps a few other minor subjects, ranging in number from 0 to 177, the majority being below 20, once a week in comparison would be a good showing.

2.—Essay writing is confined to the senior classes; even with this restriction, very few are written, so few that it ought to be stricken from the course, the recitations and lectures meeting every requirement.

3.—The lectures average about one or two a month during fall and winter, and they have embraced a wide range of subjects.

In view of the general rules of the War Department, defining the scope of the studies, and what has already been accomplished in our schools and colleges, the gradation of military studies, practically and theoretically, almost suggest themselves, but to promote uniformity the following graded system is submitted.

I. THE PRIMARY OR GRAMMAR SCHOOLS.

It is in these schools that our boys should acquire the first

military ideas, to be broadened step by step until they are completed in the college or university. All boys without any constraint like to play at soldiering. I dare say many of us can recall the days when we made our soldiers hats from paper, *à la chapeau*. The boys in this grade should be armed with wooden guns, which with present facilities, should be made as near the real rifle as possible, large and complete enough to be used in the sighting and aiming drills, the manual and the bayonet exercises; and the boys should be organized into squads, platoons, and perhaps companies, according to age. The officers and non-commissioned officers should be formally appointed in orders, receiving commissions and warrants, which, though simpler, should be as nearly like those used in the army as possible, and in order to encourage a proper *esprit de corps*, should be formally presented by some distinguished person.

I. PRACTICAL.

(1) Gymnastics, embracing as many of the seventeen tactical exercises and calisthenic exercises suitable to the age of the boys and the facilities at hand.

(2) School of the soldier, embracing the following movements: position of the soldier; the rests to include Par. 25,* eyes right or left, facings and perhaps the salutes: the steps suited to the age of the boys; manual of arms to include Par. 97;* the bayonet exercise when practicable; the movement of the squads as far as sizing, alignments, marching, turning to include Par. 141.*

(3) Platoon movements, embracing: platoons right, etc., change direction, form line right or left and on right or left into line; platoons right forward fours right, platoons column right, etc.

(4) School of the company—Embracing—To size the company; to form the company; alignments; open and close ranks; to dismiss the company; in line to march by the flank; in line to form column of fours, and halt; column of fours marching to change direction; to put the column of fours in march, and change direction at the same time; in line, right forward four right; in line, to march in column of fours to the right or left,

* Tactics, Infantry.

and then to the front in line ; change file-closers from one flank to the other ; fours right about from column or line ; from column of fours, to form line, and the reverse while marching or from the halt ; on right or left into line ; right or left front into line ; obstacles ; column of twos or files and the reverse.

The purpose being to teach only the simplest parts of the platoon and company movements.

(5) Guard duty—Embracing the simplest forms of the roster ; posting and relieving sentinels ; how to walk post ; how to turn over orders, which should be few and simple.

(6) Ceremonies—Guard-mounting, inspection, and perhaps parade.

2. THEORETICAL.

To be by talks and simple lectures, no essays, or recitations except perhaps the latter by non-commissioned officers.

The above course to be curtailed or added to according to circumstances.

II. NORMAL SCHOOLS, COLLEGES AND UNIVERSITIES.

In these advanced institutions the course of military drills and discipline should be as extended and complete as it is possible to make them, so as not to interfere seriously with the other departments of education.

I. PRACTICAL.

All that has been set forth for the minor schools except the course should be completed, and in addition the following :

(1) Cavalry—When this branch is taught it might embrace the following : the seventeen mounted exercises ; manual of carbine and of sabre ; the school of the trooper ; horses saddled and unsaddled ; mounting and dismounting at all gaits ; vaulting and leaping ditches and bars ; riding double ; patrol, and reconnoissance.

(2) Artillery—As far as practicable, formations of detachments ; manual of the piece ; mechanical manœuvres ; aiming drill. Sabre exercise ; target practice.

(3) Infantry—All the battalion movements practicable.

(4) —Generally.

1. Duties of guards and sentinels.

2. Small-arm target practice, and how to use reloading tools.
3. Military law, as far as holding mock courts-martial.
4. Castrametation—camping and marching, when practicable, the State furnishing the canvas.
5. Signalling, and the use of the heliograph when practicable.

The following division of drills has been found to work well in practice.

- 10 minutes setting-up drill or calisthenic exercises.
- 10 minutes bayonet exercises.
- 10 minutes manual.
- 30 minutes company and platoon drill.

2. THEORETICAL.

This is by recitations, essays and lectures, and as the time for this is limited, the time to be devoted to it must be left to the judgment of the military professor.

The course of military study as above indicated should be so conducted as not to make it irksome or too much of a task, on the contrary, by tact, skill, and good management the enthusiasm of the boys may be aroused, which is synonymous with success. In consequence of the time for practical work being so limited, the above division of time per drill will be found to work successfully, as it gives a pleasant variety. At inspections and competitions, officers, etc., should be required to drill the company or subdivision.

Aside from the policy and patriotism involved in the military education of our young men, if the Military Department is efficiently conducted, and its discipline wisely and carefully administered, appealing rather to the moral sense, and thereby rousing the enthusiasm of the cadets, the result will be a splendid *esprit de corps*. The young men will have acquired habits of neatness, order, punctuality, obedience and courtesy, all of which give to the character of the man that equipoise and mastery of self so essential, in a purely educational sense, and later on in the battle of life. To quote the words of a gentleman among us to-day, Capt. Lee—"The healthfulness of the military

exercise is splendid and the effect of military discipline in the formation of character"—must result in the developing the finest traits of manly character—and a high standard of citizenship—State and National.

TO PROMOTE THE EFFICIENCY OF NON-COMMISSIONED OFFICERS.

BY FIRST LIEUT. C. W. FARBER, 8TH U. S. CAVALRY.

GOOD, capable non-commissioned officers form so strong a backbone to an organization, be it troop, company, or battery, that if the non-commissioned officers are not up to the mark of reasonably fair efficiency, there is no end of annoyance to the commander. Whenever called upon to go through its paces, the organization shows up its defects most glaringly, these to a certain extent are beyond the remedy of the captain, and the service suffers accordingly. All officers who have commanded troops and have been called upon to fill vacancies amongst non-commissioned officers have observed that sometimes the "material" for a non-commissioned officer was indifferent, bad, or altogether absent. At such a time the captain shakes his head, sighs, selects the one he deems best entitled to the extra \$2.00, makes the man a corporal and trusts to luck. If on drills the new corporal goes wrong, or does nothing, which is nearly always the case, the captain shouts himself hoarse in trying to command the troop and the corporal's squad at the same time. If on guard or on other duty the corporal's military knowledge is deficient, the captain hears from the commanding officer, and he is also kindly informed by his brother officers of the corporal's lack of brains. The corporal, however, may be a good man, but one who has never had any ambition. Now, on account of the honor so suddenly thrust upon him, the corporal finds himself in a perplexed situation, and in the eyes of his comrades in a more or less ridiculous one. Yet this same man once roused and brought to a realizing sense of his position, may with study and attention, become a good non-commis-

sioned officer; but during his developing period the troop is deprived of one bone of the military vertebrae. How many non-commissioned officers are there in each troop who understand how to make out the troop returns and reports, keep rosters and the troop records? How many who know what the ration consists of and how to get it, or are well versed in the method of performing guard duty, and do it properly? Even drills, the number who can take out a squad and go through all the evolutions perfectly, is small indeed. As file-closers, and in the squad room, they require constant prodding. How many times is not the captain compelled to directly jump the private for little remissnesses which the corporal or sergeant has neglected to correct, and which correction was strictly within the sphere of duty of that non-commissioned officer? Again, there is too much familiarity with privates, not that the private soldier is unworthy of the notice of the non-commissioned officer, or that he should have no intercourse with him, that would be absurd; for two brothers, or father and son, might be serving in the same company, or the non-commissioned officer's best friend might be a private—the distinction is only one of degree in a particular class in the military system. There are certain things which the non-commissioned officer can do and others which he can not or should not do. But how many corporals, even sergeants, are there who exercise the proper regard for the proprieties of such intercourse?

Many a corporal would like to throw up the stripes and not be bothered with them, if he had the courage to do so, but fear of the displeasure of the captain keeps the chevrons on his sleeves, and he slumps through his duties after a fashion. There is not enough in it. Notwithstanding the foregoing, I have no doubt that the non-commissioned officers of to-day are as good men as can be selected for that purpose, and that they do their duties as well as they know how, are loyal and behave well enough, yet there is lots of room for improvement. But why should this be so? In my opinion, for the reason that the position of the non-commissioned officer is not elevated enough. To accomplish this, he should first receive more pay—a stipend commensurate with his rank and the amount and quality of work demanded of him. I think \$20 for a corporal, \$25 for a sergeant,

and \$35 for a first sergeant, would not be too much to start with, if what follows in this paper is carried out.* Next he should have more privacy and enjoy more privileges. Non-commissioned officers should have a separate sleeping room or rooms and a private mess, or at least a separate table in the common dining-room. This would engender more respect on part of the privates.

The next condition would be to have only non-commissioned officers who are thoroughly proficient in their duties and are men of intelligence and good moral character.

The requirements should be an actual and complete knowledge, theoretical and practical, of all the drills in the "school of the soldier"—the "trooper"; also school of the troop and instruction in varied ground—all the ceremonies as far as they affect a captain—stable management, biting of horses, marches, camping and cooking. Each man should understand how and be able to make up all the troop reports, records and rosters; in short, have the ability to enter the orderly room and perform the clerical work necessary in a troop. I know that not every non-commissioned officer would be qualified to be a first sergeant, but he should know what a first sergeant has to do. He should have a sound knowledge of guard duty in all its phases and be familiar with that part of Army Regulations which relates to enlisted men. He should understand the elements of minor operations of war and of hasty intrenchments. Also easy and practical parts of field engineering and be taught elementary topography. It should be firmly impressed upon him that his knowledge of these things is to be used for the purpose of instructing the privates in his troop.

That he is at all times to set an example in neatness of dress and conduct and is firmly to carry out his troop commander's orders and ideas, always working in harmony with his captain and the privates.

At first glance these things may appear to be too much to learn, and exacting from the non-commissioned officer more than he is capable or willing to perform. But such is not the case.

* Bills increasing the pay have been under consideration before Congress, and it is not unreasonable to hope that such a bill will soon pass. The first step has then been reached.

A careful consideration will show that all the subjects enumerated come within the scope of ability and requirements for the non-commissioned officer of to-day. In fact, he is now supposed to know just this.

The object should be to teach non-commissioned officers in such a manner that when they are pronounced proficient, they actually do know these things and can impart them to others. It is not to give the captain and lieutenants an easy time—so that the captain can say: "Sergeant, drill so and so," and then go home and sleep. It is for the purpose of strengthening the efficiency of the troop, giving the officer more time to devote to instructing his non-commissioned officers and men in the higher duties of the art of war.

Modern armies gradually demand more and more work on part of officers and men, and it is simply to reach the first step that non-commissioned officers should be thus taught and to give the captain an opportunity to get beyond the point of always only giving his non-commissioned officers the most elementary instruction in such matters.

In order to bring non-commissioned officers to this standard of efficiency, two schemes are suggested.

The first is to establish a non-commissioned officers corps—a permanent school—at some centrally located post. One corps for each branch of the service. For example, let us deal with the cavalry only.

This corps should consist of four troops of seventy-five men each, every troop to be complete in officers and non-commissioned officers, a field officer to command the whole. The officers should be detailed for a period of years and be the instructors of the corps. Recitations, lectures and practical exercises should be had and given in the foregoing list of subjects. At the end of the course an examination should be held which would determine the qualification and standing of the candidates. All those who pass successfully should be assigned as corporals to regiments where vacancies exist. A candidate who fails at his first examination should be allowed one more course, and if he fail a second time should be sent to some regiment as a private. Thus each regiment would be supplied directly from this corps—the colonels making requisition for non-commissioned officers as vacancies

occur in their regiments. Generally a vacancy can be anticipated and the captain can communicate with the regimental commander in time to have the new non-commissioned officer on hand when the old one goes out.

Candidates who have passed but for whom no vacancy exists would be placed on a waiting list and would be promoted in order of their standing. If no vacancy occurs within one year, the candidates should be reëxamined. The grade of sergeant would be by seniority in each troop, except that, where as a punishment for some offense or for some cogent reason the captain decides to pass over the delinquent. This would form one incentive to keep the corporal on his good behavior. First sergeants should be appointed and returned by the captain from the sergeants, as at present. For offenses committed by these non-commissioned officers they should be tried by general court-martial as at present and be reduced to the ranks by sentence of general court-martial, and when necessary, for incompetency or some other strong reason, summarily by the colonel upon recommendation of the captain. The course should not be less than eight months.

To secure proper men for this corps, a clause inserted in the recruiting circular should inform applicants for enlistment that men of excellent character, of fair education and possessing the qualifications necessary, may apply for enlistment in this corps, with a view to becoming non-commissioned officers. The recruiting officer should make a preliminary examination to determine whether the man is possessed of the necessary qualifications; if so, he may send him direct to the corps; if not he may still enlist him as a recruit if the man so elect. The maximum strength of this corps need not be exceeded even if there are plenty of applicants. If economy is to be the ruling spirit and this corps of 300 men cannot be allowed in addition to the present strength of the enlisted force, it might be included without detriment to the service. For this corps of four troops would be in perfect organization and in emergencies could be called upon for service as well as any ordinary squadron. It would not cost much to establish such a school and the benefit to the country would be great, whether the non-commissioned officers reënlist or not, though the former is more likely. It

would also establish a sort of middle class in the army which might become very popular with the civilian. The existence of this school should not deprive or exclude privates in troops of the various regiments from becoming non-commissioned officers. Any private in good standing and of suitable character who may wish to become a non-commissioned officer may make such application to his captain. If the man proves to be suitable, every opportunity and facility to learn a non-commissioned officer's business might be given him. He should study the text-books used at the school, and when he considers himself ready, and in the opinion of the captain is so, the captain will call for a board of officers to examine the candidate. Such examinations could be made periodically and the board could examine a number of candidates at the same time. If the man passes, the colonel will appoint him to the first vacancy in the regiment, or if the candidate so desires, he may wait until a vacancy occurs in his own troop. Passed candidates await promotion in order of their standing. Provision should also be made to permit such privates who are so recommended, to be sent to the non-commissioned officers corps for a course of instruction, provided the maximum strength is not exceeded.

The second scheme is this :

The War Department should establish a suitable course of instruction for non-commissioned officers, embracing the subjects mentioned before, and should furnish a requisite number of text-books for each post. If a private of suitable character and qualifications aspires to become a non-commissioned officer he should be required to pass an examination in the subjects as prescribed in the course. The examination should be partly in writing and partly oral, depending on the subject. He should be required to drill and give such practical evidence of his proficiency in elementary topography, field engineering, etc., as may be prescribed. This examination should take place before a board of officers appointed by the commanding officer of the post. A minimum percentage of proficiency should be established by the War Department. When a candidate has passed successfully he should be appointed by the regimental commander to fill the next vacancy in the troop to which he belongs. In this way the man remains in his old troop. There is no objection to having in

each troop several candidates who have passed and are waiting for vacancies. The one year waiting rule should here also be followed. To carry this method into effective operation, the privates who have applied to their captains and by them approved, should have all the reasonable facilities and assistance accorded them by an officer specially detailed at each post to superintend the studies of such men. Days and hours should be set for recitations and instruction. Captains should be directed to allow such men to drill squads and should help them along whenever they can. In no case should such studies interfere with the candidate's duty as a private. Where there are no voluntary applicants, the captain should select men best fitted for the position of non-commissioned officer and detail them for instruction as a military duty. To the first scheme—that of a corps—the old objection might be made by officers and men of a troop to imported non-commissioned officers. In former years an imported non-commissioned officer did not receive the kindest reception, but in these short-term days and continuous changes this objection would hardly have any ground, if it exist at all, and as soon as the great benefit to the service has been manifested, would disappear altogether.

It may also be said that when a private applies for the position of non-commissioned officer, he puts himself on record as having aspirations, etc., and might be jeered and ridiculed by the men of his troop. This may have been true of old, but I do not believe it to be the case any more, as the men of to-day are of a different stamp, possessing more education and have a sense of the fitness of things. Furthermore, this new system would give the non-commissioned officers a feeling of independence which they can not always attain under the present method of appointment. Promotion to a lieutenancy does not seem to create such feeling. Why should it then for an inferior but really more appropriate position? Whatever may be said in favor of the non-commissioned officer of old—the ever rough and ready, illiterate, but good in his way non-commissioned officer—he has had his day. New conditions demand a new order of things. An examination for non-commissioned officers is a move in the direction created by new conditions and necessities of a modern army. With a substantial difference of pay, with

more privacy, with a proper regard for their position, by examinations making this position harder to secure, but more elevated once attained, the non-commissioned officer will look with pride upon his office, the privates will regard it with longing eyes, while it will prove a fine stimulus to promotion as well as to the enlistment of a yet better class of men, and a great benefit to the service in peace and especially in war.

Reprints and Translations.

MACHINE GUNS: THEIR TACTICS AND EQUIPMENT.

BY LIEUTENANT G. E. BENSON, R. A.

(From the Journal of the Royal United Service Institution.)

A GREAT deal has been written of late years about machine guns and the manner in which they may be employed, but unfortunately the opinions of the various writers vary to such an extent that it appears almost hopeless to arrive at any conclusion as to their use in civilized warfare without actual experience in the field.

It may, perhaps, be thought that the subject has been pretty well threshed out, as far as writing is concerned, by the various officers who have delivered lectures in this Institution; and on that account it appears to be somewhat difficult to find any new suggestions to bring forward which may be worthy of discussion. In face of this difficulty I propose during the course of the lecture to repeat briefly the various suggestions that have been made for the use and equipment of these weapons, and give reasons for and against them, before bringing forward my own proposals. I think the great power of machine guns is too universally recognized to require any further illustrations by me, and I will therefore simply state that in practice with a 10- and 5-barrelled Nordenfelt carried on at Bangalore in August and September, 1884, before Sir Frederick Roberts, the following results were obtained:

The 10-barrelled gun was found to fire about double the amount of ammunition in a given time (2 minutes), and obtain about the same number of hits, as fifty marksmen and first-class shots at 1200 yards range.

The 10- and 5-barrelled guns firing together for 2 minutes at 2450 yards gave 192 hits on a horizontal target out of 855 rounds, while two 9-pr. H. A. guns which fired shrapnel for 9 minutes gave 394 hits. The striking velocity of the shrapnel bullets was much greater than that of the Nordenfelt. The angle of descent of the latter was about 20° , so that they would have reached troops behind earthworks. It was noted throughout the practice that the 5-barrelled gun did not hold its own in rapid long-range firing by reason of its want of weight and stability. This shows that apart from greater rapidity of fire greater accuracy is also obtained from the heavier class of machine guns. In the above experiments the Nordenfelts were worked by unskilled men.

About a year ago a pamphlet on this subject was written by a M. Gustav Roos, at St. Petersburg, and he informs us that experiments in Russia have shown the following results:

- (1.) One 5-barrelled Nordenfelt=50 men.
- (2.) At 950 yards a single machine gun produced a greater effect than two field or mountain guns.
- (3.) From 950 to 1700 yards a single machine gun produced the same effect as two field or mountain guns.

He lays great stress on the laying mechanism enabling fire to be continuous and effective when the front is obscured by smoke or darkness, and this I found to be of great importance in the Soudan, when laying these guns before nightfall, so as to sweep the ground in case of a night attack, thus making sure of the fire being effective in the darkness.

The two great questions on machine guns are these :

1st. What should be their means of transport ?

2d. To which arm of the service are they to be attached ?

The answers to these two questions are dependent on each other. If they are to be attached to the mounted branches they must be able to get over the ground quickly enough to accompany them on service. For this purpose pack transport appears unsuitable, as it entails men marching on foot to lead the animals. Apart from this, pack transport has the following disadvantages :

- (1.) A long train of pack animals would be required to carry sufficient ammunition for one machine gun ; for an animal can only carry on his back one-third of the weight he can draw at speed.
- (2.) The heavier class of machine guns producing the best shooting (as shown by the Bangalore experiments) would be too heavy to mount on a pack animal.
- (3.) The delay in coming into action and moving them short distances.

In my opinion one of the most important considerations in deciding on the method of transport of machine guns is the carriage of ammunition. Some men have urged that it is a mistake to imagine that such a large supply is required with machine guns, as they never have to fire rapidly for a long period, and in support of this theory it is pointed out that in the recent operations in the Soudan a comparatively small amount was expended. But it is forgotten that the most important fights where they have been used seldom lasted more than half an hour, which is very different from the duration of a battle between two civilized powers. Suppose you have a machine gun on pack animals, as suggested by Major Anderson, R. H. A., in a lecture recently delivered here ;* according to his plan, one mule is for the gun and the other for the ammunition, while a reserve of ammunition is to be provided for elsewhere. As this ammunition mule can only carry about 1000 rounds the supply would be totally inadequate, and the gun would be useless till the reserve ammunition succeeded in finding its way to the spot.

On the other hand, if you have a string of ten mules to carry the 10,000 rounds per gun which are necessary even for the lighter natures,

* *Journal*, No. 138, p. 45.

think of the number of men required to lead these mules, the size of the mark they would offer, and the space they would occupy on the line of march when this number is multiplied by the number of guns, in addition to which these long strings of pack animals are most unwieldy for manœuvring. With the gun and ammunition on wheels many of these disadvantages disappear, for (1) a heavier and therefore more powerful and accurate gun can be carried; (2) a larger amount of ammunition can be carried actually with the gun. (3) If drawn by horses, great rapidity of movement is attainable in such country as campaigns between civilized powers generally take place in. (4) The limbers and axletrees afford seats for the men who with pack transport must march on foot. The principal advocate of this kind of equipment has hitherto been Lord Charles Beresford, who recommends it as combining great rapidity of movement and a plentiful supply of ammunition.

It has been suggested (notably by Captain Armit*) that these weapons should be mounted on light carriages drawn by infantry. The arguments against this method are, I think, patent to everyone. The most obvious are:

(1.) The enormous labor of dragging these guns in a campaign. Men usually have enough to do to drag themselves along without making them pull a gun as well, and their strength may be far more usefully applied than by turning them into draught animals.

(2.) Sufficient ammunition could not be carried with the gun.

(3.) This style of draught would give the machine guns the least possible mobility, while what is required for every arm is the greatest possible mobility.

Another system, which is now being tried in several cavalry regiments, is to mount a gun on a two-wheeled limber, with the ammunition underneath the gun. It is intended to be fired without unhooking the horses by two men on the limber. This system has certain points in its favor—notably its mobility and readiness in coming into action. But I think a good many will agree with me in urging the following objections to it:

(1.) That sufficient ammunition cannot be carried, probably not more than 2000 rounds at the outside, which would not last more than six or seven minutes in rapid firing.

(2.) The breathing and motion of the horses would impair the accuracy of the fire; anyone who has seen a battery of artillery after a gallop for half a mile will readily understand how the blown horses move the limbers. †

(3.) Supposing a horse were hit, the gun would be put out of action

* *Journal*, No. 133, p. 37.

† This objection has been met by Mr. Nordenfelt by taking the weight off the shafts off the horses by means of a prop on coming into action, but this does not affect the other objections in any way.

till the horse was extricated. The limber may act as some sort of protection from frontal fire, but not when fire becomes in the slightest degree oblique, and the gun might thus be put out of action at the moment when its fire is most wanted. Besides this, the mere falling of bullets or shell near the horses would cause them to become unsteady and spoil the shooting.

(4.) The gun cannot be detached from the limber to be run up into a position, either where horses cannot go on account of rough ground, or where it is desired to run the gun up the reverse slope of a hill just far enough to be able to fire over the top and not be seen by the enemy when coming into position. If the horses take them up under these circumstances they would form a large object with the limber and probably be seen at once.

(5.) Difficulty in getting cover for the gun thus mounted when used in the defense of positions, for the great height of the gun from the ground (nearly 6 feet), and the size of the limber would make a very large epaulement necessary to hide it. On the other hand, of course, the extra height would enable it to fire over a higher parapet which would give more cover to the men.

Now if we put the gun on an ordinary light gun-carriage with a trail hooking on a limber the above objections disappear, for an increased amount of ammunition can be carried by means of axletree boxes on the carriage, while the limber, no longer hampered by the gun on top of it, could carry an increased number of rounds. The gun would be fired with the trail resting on the ground, and could be one of the most powerful class. The importance of this latter consideration is sufficiently seen in comparing the practice of the 5- and 10-barrelled Nordenfelts at Bangalore in the experiments previously referred to, the 10-barrelled gun proving itself more than twice as powerful, and more accurate at long ranges than the 5-barrelled gun. It is also evident that the horses could be placed under better cover, and when one was struck it would not interfere with the fire of the gun, as in the case of the gun being mounted on the limber. The gun could also be detached from its limber and run up into positions required, say, up the steep reverse slope of a hill, while the horses and limber would remain under cover further down the slope in rear.

The chief objection urged against this method of mounting is the weight and consequent number of animals required to drag the gun, and the consequent expense in equipping them. But I will endeavor to show that though this method is apparently the most expensive, it is in reality the most economical. For the sake of argument we will take the Nordenfelt 10- and 3-barrelled guns, and assume that the heavier gun with its 10 barrels is only three times as powerful as the 3-barrelled gun, thus making three 3-barrelled guns capable of delivering the same amount of fire as the single 10-barrelled gun. The latter weighing over 2 cwt., cannot be carried by pack animals, while from its breadth it

cannot be mounted on a limber without taking up most of the room required for ammunition. The 3-barrelled gun is the weapon recommended for pack transport and for mounting on a limber. The 10-barrelled gun mounted on a field carriage with limber, the whole carrying 5000 rounds and three men on the boxes, weighs about 25 cwt., and therefore can be drawn at speed by four horses. Add a horse for a N.-C. O. in charge, and we have a total of five horses, one N.-C. O., three men on the seats, and two drivers. A 3-barrelled gun mounted on a limber has with 1546 rounds and two men, takes two horses to drag it and one N.-C. O. on another horse to look after it. Three guns mounted like this, having altogether 4638 rounds, will therefore take—

9 horses,
3 N.-C. O.'s,
6 men, and
3 drivers.

While in the former case we have :

5 horses,
1 N.-C. O.,
3 men, and
2 drivers,

thus showing a saving of four horses, two N.-C. O.'s, three men, and one driver. This is a very considerable saving, while as regards space occupied on the march, in camp and on the battle-field, and ease of control of fire, the single powerful 10-barrelled gun has an immense advantage over the more numerous but less powerful 3-barrelled guns. Comparing the same guns when the 3-barrelled gun is carried on mules, the advantage of the 10-barrel is still more decided, for four mules are required for the gun and carriage and about 1500 rounds, thus making twelve mules necessary for three such guns, while at least six men per gun or eighteen in all would be required for mounting and dismounting the guns and looking after the mules. We thus have eighteen men and twelve mules against six men (two drivers) and five horses. Of course a much larger supply of ammunition than the amount above mentioned is necessary, and this must be brought up on wheels unless the country is impracticable, in which case the organization would be more that of a mountain battery. Yet another point in favor of the gun-carriage and limber principle is that you have a good supply of ammunition close at hand, the immense importance of which is fully brought out and impressed on us by Prince Hohenlohe in his letter on the supply of ammunition during the wars of 1866 and 1870-71, recently published in the R. A. Institution papers.

Having argued out the question of transport thus far, and fixed on a style of carriage which combines three great desiderata, viz., (1) extreme mobility ; (2) considerable ammunition supply ; (3) a steady platform from which to fire the gun, we now come to consider the tactical

organization of these weapons. In order to do this properly, it will be necessary to, so to speak, analyze the fire of machine guns.

Without again going into the detail of any experiments, I will point out the following characteristics of their fire :

(1.) The great power of concentration and rapidity of fire, which enables them to do a great deal of damage at a given point in the shortest possible time.

(2.) Power of turning the stream of fire at will in any direction required during the actual firing.

(3.) The continuity of their fire, *i. e.*, the fire goes on continuously without any stop for laying after every round as in the case of the infantry rifle and the field-gun.

(4.) The great control of fire, owing to the whole of the firing in each gun being done by one man.

The first of these is equally characteristic of artillery, and is due, generally speaking, to the fact that in a battery, taking a gun as a unit, there are only six units to direct, while in a battalion there are 1000 units or so, of which perhaps 300 are in the fighting line ; and here the front over which they are extended is much greater than in a battery, thus making supervision still more difficult. No. 2 is a characteristic belonging to machine guns alone. No. 3 belongs only to a machine gun as a weapon, but this continuity of fire is of course also attainable by the other arms when there is a sufficient number of them. No. 4 applies equally to artillery and machine guns, and results from the small number of units in one command.

From the above we gather that there some useful qualities pertaining to machine-gun fire which are not shared equally by that of the other arms, and it therefore behooves us to use these weapons in such a way as will bring out these qualities and make the utmost use of them. The effect of fire is said to depend on two things, viz. : (1) its suddenness ; (2) its intensity. The latter is a quality evidently possessed by machine guns, but it has not necessarily the former, as the suddenness depends on the circumstances of the case, and whether it is expected or not. Clearly then to make this fire unexpected and sudden, it is necessary to make the weapons as mobile and as capable of rapid movement as possible, so that they may be placed in the required spot at the required moment, which means practically, if accomplished, that their fire will be sudden and unexpected by the enemy. For instance, they might be required to gallop off in order to check an attack at a threatened point, or seize a favorable opportunity for enfilading the line of the enemy, whether of guns or infantry. The intensity of their fire makes them capable of doing such an immense amount of damage in a short time that their power of rapid movement increases tenfold their power and moral effect. There is still another point about these weapons which I think is worth noting ; it is the difficulty of distinguishing their position at long ranges when infantry are firing alongside of them. To

illustrate this I may mention that at the Easter sham fight at Dover this year, I was with the attacking force, and when my battery came into action in the most advanced artillery position, about 800 yards from the defenders, I could distinctly hear the well known rattle of their Norden-felts, but could not be certain where they were, as the smoke caused by them was the same as that caused by the musketry fire, whereas the smoke of artillery, even at a much longer range than this, at once betrays the position of the guns. If smokeless gunpowder could be introduced, it is evident that the position of the machine guns would be still more undistinguishable.

I think I may assume that the value of these weapons in the defense of fortresses and fortified positions is too universally recognized to require further comment. It is their use in the open field about which there is so much controversy.

No doubt in 1870-71 they were a failure, but their failure is attributable to the following defects :

- (1.) The imperfect nature of the weapon used.
- (2.) Want of training on the part of the men. They took the guns direct from the arsenals to the field of battle without any previous training.
- (3.) Misapprehension of their tactical use. They seem to have been placed in line of battle to contend with artillery at ranges at which their own fire was comparatively powerless, and were thus easily destroyed instead of being reserved under cover for ranges where their fire would be more effective. As in most of the battles in that war the French stood on the defensive, we have no example of their being used on the offensive.

The ranges at which machine-gun fire is most decisive in its effects compared with that of other arms are probably those between 800 and 1600 yards, and in future wars it appears that battles are not unlikely to be decided at those ranges. Under 800 yards the power of infantry fire increases very rapidly, and over 1600 yards that of machine guns diminishes so much that they would be overwhelmed by artillery fire. Thus the machine gun cannot supply the place of skirmishers nor yet that of artillery, but would play a very special rôle when occasion required, whenever it could be brought into the required position at the right moment. M. Gustav Roos supports this theory and says that : "The machine gun constitutes a special arm, having its own definite sphere of action, within the limits of which the enemy is struck in the most advantageous manner by the weight of metal projected, and with a smaller loss of time and men than in the employment of any other arm whatever."

I think it is pretty plain that if I have correctly analyzed the fire of machine guns there are several very important differences between the conduct and control of that fire and that of infantry ; in fact, the only point in common appears to be that they both fire bullets of the same

pattern ; for I maintain that there is a very important difference in the effective ranges of the rifle and the machine gun when the former is handled by large bodies of men which are very difficult to control in extended order in the excitement of the battle. Machine guns can, from the control under which they may be held, open fire with effect at ranges where a very large proportion of the infantry ammunition would be wasted. In this control of fire and power of concentration on one object they resemble artillery, but have not sufficient range to contend successfully with that arm except under certain conditions. A point where they have the advantage of artillery is that there being no recoil, they can come into action on a steep reverse slope where, if field-guns were fired, the recoil would send them to the bottom of the hill. The fact that they can keep up an effective fire when the front is obscured by smoke or darkness, provided they have been previously laid, has already been noted. They also share with artillery the bad quality of powerlessness during movement, for anyone who has sat on a limber going at speed over rough ground will realize the impossibility of firing when in movement. The men have enough to do to hold on without having to fire a gun as well. Machine guns can, however, from the simplicity of their ammunition, come into action quicker than artillery.

With cavalry the machine gun has nothing in common except, perhaps, its power of rapid movement, for cavalry are supposed to act by shock while machine guns act by fire alone.

Since these weapons have so little in common with the other arms, it might appear that we are as far off as ever from settling the question as to which arm this weapon is to be attached. On the contrary, I think we are now near a solution of the problem.

Cavalry and artillery are generally recognized as the auxiliary arms, the use of the former being to gain information on which the infantry may act, to protect the flanks of the infantry when engaged, and to pursue the enemy when beaten by the infantry ; the use of the latter being to prepare the way for the infantry by bombarding the enemy's position, and to follow up the enemy's retreat and convert it into a rout by the fire which is brought into play by means of their rapidity of movement. Therefore naturally we must look on machine guns as another auxiliary arm invented by modern ingenuity, just as cannon were invented by the ingenuity of men some centuries ago and made part of the fighting forces of the period.

Let us examine the different stages of a battle, and note the various rôles of the machine guns in each stage. As the two armies approach each other the hostile cavalry meet. This is the preliminary or reconnoitring stage, and one drives the other in till checked by the enemy's infantry. Machine guns can evidently be given the mobility necessary to accompany cavalry, and their rapidity of fire and readiness in coming into action would enable them to act with the greatest effect during the very short time the hostile bodies are in the act of approaching each

other before charging. In conjunction with horse artillery and dismounted cavalry, they might even drive back the first infantry outposts of the enemy met with, the machine guns approaching to effective range, covered by the fire of the horse artillery.

During the preparatory stage of the battle, when the artillery are bombarding the enemy's position, the machine guns might be drawn up echeloned in rear of the flanks of the line of guns, themselves out of fire, but able to prevent by their fire any dashes made by bodies of the enemy's cavalry on the flank of the guns. When the enemy's attention was thoroughly engaged by the artillery duel, and the battle-field obscured by smoke, opportunities might occur for them to make a dash forward, accompanied by cavalry, to close range, if possible on a flank, and if successful the damage done to the enemy's gun teams and gunners in a very short space of time would probably be enormous. However, they cannot well be used against artillery with success unless they can take it by surprise or in flank within 1700 yards or so; but under these conditions the dismay and confusion this sudden hail of lead would cause can well be imagined.

Modern fire-arms and discipline have made it more than ever necessary to beat down the courage and reduce the numbers of the defenders of a position before the infantry can advance to the assault, and in this duty machine guns could render important services in the later stages of the bombardment when the artillery of the defense is more or less silenced. When this is accomplished, the machine guns might approach to a range of from 1200 to 1600 yards with comparative impunity, and from a position on the flank of the line of their advancing infantry, they could pour in a storm of bullets which would search out the defender's shelter trenches, and could not but cause many casualties. It is probable that the supporting fire of machine guns could be kept up longer than that of artillery, as there is no such variable quantity as a fuse to be taken into consideration with the former weapon, and thus the infantry would receive more support at the time it is most wanted. When their fire is masked, they would turn their attention to beat off counter-attacks, and fire on other supporting bodies of the enemy till a foothold was obtained in the position. Then they would advance, as the artillery do, to confirm the success of the infantry, and hold the position gained till the infantry had again been got into hand. Their rapidity of movement, readiness in coming into action, and continuous murderous fire would enable them to do this most effectively, and perhaps in no other rôle will their effect be more felt than in this. At this and other periods of the battle no doubt great opportunities would occur at times when machine guns could advance close up and sustain their wavering infantry at critical moments, just as the German artillery did in the war of 1870-71, by firing case and shrapnel with the fuse bored very short; but the superior man-killing power of the machine guns at these short ranges, and the fact of their being smaller marks to fire at—having a

less number of horses and men for the same number of guns—would make them appear most suitable for such tactics.

In pursuit of the enemy, or retreat in face of the enemy, the above-mentioned qualities will serve in great stead the army which makes use of these weapons. At this last stage the defenders, whether retreating or being driven out of their position, or advancing after having repelled the attack, will generally be in fairly close formation, and thus make the close and concentrated fire of machine guns most deadly.

In the manner I have indicated, they might perform efficient service to all arms in turn. In order to be always on the spot for the carrying out of these duties, it might appear necessary to attach them to all three arms, or at any rate to the infantry and cavalry. But this would make it necessary to have too great a number of them altogether, and therefore for the sake of economy and simplicity it appears advisable to hold them under the hand of the general in command of each division, so that they might be told off to work with each arm as might be required. In fact they should act in conjunction with whatever arm happens to be playing the most important part in the different stages of the fight—with the cavalry in the preliminary stage, with the artillery to protect their flanks in the preparatory stage, with the infantry during their advance and assault, and again with the cavalry for the pursuit or retreat.

In order to use them in this way they would have to be organized in troops of say four guns each. I say "troop" in preference to the word "battery," because a "battery" expresses a force which batters or bombards material obstacles, whereas a machine gun is only a man-killing weapon. Each troop would consist of four guns and four ammunition wagons or carts, which should always accompany the guns on the line of march. Prince Hohenlohe in his letters lay great stress on this for artillery, and his reasoning will apply equally to machine guns. The guns would require four horses each, and if wagons similar to artillery ammunition wagons were employed they would require the same number, but probably a light S. A. A. cart drawn by two horses would be preferable, though of course the amount of ammunition carried would not be so great.

I have reckoned the war strength of a troop as above described to be as follows, allowing for store wagons, spare horses, etc. :

With ammunition wagons.		With ammunition carts.	
Men.	Horses.	Men.	Horses.
54	70	50	62

Three such troops might be attached to each division, and perhaps two to the cavalry division, making eleven troops per army corps.

The war strength of three troops, with ammunition carts, would be (allowing one forge and six horses per three troops)—

Men.	Horses.
153	192

For purposes of comparison I may say that the war strength of a battery of horse artillery is—

Men.	Horses.
182	183

Probably a peace strength of thirty horses per troop would be sufficient. Each troop would be capable of delivering a fire of 4000 rounds per minute, though it would be seldom that this rate of fire would be required. I don't know how many rounds the fighting line of a battalion of infantry could fire by volleys per minute without getting out of hand, but probably it would be about 1500 rounds, allowing about five rounds per minute to every man in the fighting line.

Attached to the cavalry division in front of an army, the value of such troops of machine guns is undeniable for holding important points seized by the cavalry before the infantry come up, and for acting on the enemy's cavalry just before the charge as previously pointed out. They would furnish the fire power which no doubt is now necessary to accompany cavalry, and to provide which it is thought advisable to organize corps of mounted infantry, though if the latter are also to be used for outpost duty and scouting, machine guns could not of course supplement their duties in that respect.

In support of the above views, I will quote some of the remarks made by Colonel Andrews, R. H. A., who was present at the experiments carried out at Bangalore previously referred to. Among other things he says:

"That their power of mobility on carriage or pack transport would admit of their taking an important part on special occasions with cavalry or mounted infantry in holding bridges, fords, causeways, etc., pending the support of infantry, and that they would also prove of good value on outpost.

"That they should have a distinct organization, each gun being under a well-approved warrant officer, and that they should take their place with any force in the field massed in battery under a Staff Officer, parked with the corps artillery, and held at the immediate disposal of the General Commanding, for distribution by him to regiments of infantry or cavalry as occasion might present, or for disposal at his discretion at any critical and suitable time or place.

"They would appear to have their greatest value on the defensive as a multiple of infantry fire, against assault of position, entrenched or otherwise. Their moral effect is great, and should it be ultimately decided to attach them more permanently to battalions, I think they would occasionally prove a valuable auxiliary to infantry and artillery in coöperation, by falling back to the positions taken up in succession by the latter arm to cover a retreat, and offer rallying points for the force."

With reference to the first part of this last paragraph, I may remark that it is an axiom laid down in all works on tactics that all fire-arms are more powerful on the defensive, and I don't see any reason why the

value of machine guns on the defensive and offensive respectively should vary any more than that of other man-killing fire-arms.

The above sketch of the tactics of machine guns principally deals with their use on the offensive, about which perhaps there has been more controversy than on the defensive, for everyone, I think, recognizes their great value in the latter case.

Their tactics in a battle fought on the defensive would be somewhat as follows: In the preliminary stage the defender's cavalry would probably be weaker than the attacker's, but the presence of a few machine guns with the former used as before described might prevent the latter gaining much advantage. When the defender's cavalry fall back on their infantry outposts and advanced posts the machine guns would certainly check the enemy's advance, the chief point to be observed being that they should remain as far as possible under cover until the enemy, whether infantry, cavalry, or artillery, should approach within effective machine-gun range, for if they fire at long ranges against the attacker's artillery they would be liable to be destroyed. If ordered to retire on the main position their services there would be rendered much in the same way. Further comments on their use on the defensive are perhaps unnecessary, but it may be expected that their great mobility would be turned to good account in making counter-attacks on the flanks of the attackers, and in enabling them to be held in central positions intact till it is absolutely certain on which points the enemy's main attacks will be delivered. If these weapons were drawn by infantry on light carriages these rapid changes of position would be quite impossible, and their sphere of action would therefore be very limited. Amid the dust and smoke of a battle-field these movements would not readily be noticed till a stream of bullets would suddenly appear from an unexpected quarter, and once the range is found, a few minutes' fire from these weapons means annihilation.

Long-range infantry fire has of late assumed an importance hitherto unthought of, but there are so many disadvantages connected with it, *e. g.*, in the men getting out of hand and the expenditure of ammunition when it is difficult to distribute a fresh supply among an extended line of men under fire, that the use of this fire is by no means an unmixed advantage. Perhaps machine-gun fire is the best sort of long-range infantry fire on account of its greater accuracy and the comparative ease with which the supply of ammunition can be renewed, as it has not to be distributed among so many units.

Proposals have frequently been made for making machine guns actually part of an infantry battalion and cavalry regiment. It is proposed to attach a certain number to every infantry battalion, in order to supplement the fire of the battalions, because a machine gun is called a cluster of rifles, but we have never yet heard of any sound scheme for their use in action when so attached. They cannot possibly accompany the shooting line of the attackers in action, for they would at once become a con-

spicuous mark for the defenders, as they cannot lie down and fire as infantry do. Moreover, if carried on mules and the mules be shot, the gun would be practically useless, as it could scarcely be expected that the men would bring it along, and then again comes the question of carrying a large amount of ammunition under close infantry fire. If mounted on wheels and drawn by mules or horses, it would soon be rendered stationary by the same fire; and the reasons why it cannot be drawn by infantry have already been given. On the other hand, if placed to a flank about 1000 to 1500 yards from the enemy to perform its functions as long-range infantry fire covering the advance it would be a long way from the battalion it belongs to, and therefore completely out of control of the officer commanding the battalion. If worked thus away from the battalion, the commanding officer would have to detach from his probably already too weak battalion a certain number of officers and men to look after weapons over the service of which he would no longer have any control. This idea is simply a revival of the old battalion gun system which was proved long ago to be entirely vicious.

Again—suppose the battalion to be acting on the defensive—the machine guns would be placed to defend special points, such as salients, to sweep roads, etc. In this case is there any advantage in having them as part of the infantry battalion? I say certainly not, for they would perform these duties equally well if they did not belong to the infantry. Would it not rather be probable that if belonging to a battalion in a defensive position, and that battalion were to become unsteady, the same unsteadiness would affect their comrades with the machine guns, whereas if they were distinct from each other there would be a sort of rivalry between the riflemen and the machine-gun men as to which would hold on to the position the longest. Much the same kind of reasoning applies to the case of their being attached to regiments of cavalry. If they are to be used with cavalry, as I saw the gun of the Tenth Hussars used the other day at the Agricultural Hall, viz., to fire on the enemy's cavalry from a flank just before the charge of the two hostile bodies, why should not horse artillery be so attached, and yet if such a thing were proposed it would be received with ridicule.

Imagine a cavalry regiment sent off on reconnoitring duty over very rough country, which though passable for horses was so in a much less degree for wheeled carriages, or ordered on any duty where machine guns were not required. What would the regiment do with its machine guns? It must either leave them behind, in which case the regiment must be split up, or else they would hamper the movements of the rest of the regiment by causing it to wait for them in difficult places, or they would have to carry them on pack animals, in which case a total change of their equipment would be necessary, at the expense of having a greater number of animals than ever.

It was once proposed to attach them to batteries of artillery. But I believe this project has long ago been given up. In fact it was most

probably this very proposal which led gunners in the first place to set their faces against these weapons.

Such organizations as these are opposed to all the lessons of war and to all ideas of that simplicity which is so essential in warfare; the officers and men of such corps would be required to know everything about their arms, and thus their work would be doubled, or else the special officers and men selected for the machine guns would be left to themselves, and practically constitute a separate unit.

In addition to this the principle of concentration of fire of several machine guns at once on certain localities must be kept in view, and it could not be managed if in order to do so it were necessary to collect the scattered little machine guns from the various battalions and regiments, for that would take up valuable time, and even when massed together (as suggested in Major Anderson's lecture) the want of previous practice in working together would make proper regulation and control of fire an impossibility. It is easy enough to get forces to act separately which have been trained to act together, but it is a very different matter to get those to act together who have only been taught to act separately.

Their method of working when supporting their infantry would probably be something after the mode at present recommended for artillery, viz., to direct a concentrated annihilating fire in turn on the various portions of the line to be attacked. The necessary fire discipline to accomplish this would be absolutely unattainable with a heterogeneous mass of little machine guns from the various battalions without any organization in units or any chain of responsibility. The three powerful troops of divisional machine guns that I suggest would deliver a fire equal to that of three dozen of the light machine guns which could be carried on mules or pulled by infantry, while in the fire discipline of the two forces and the space of ground occupied, there would be no comparison. Again, after the action was over, imagine these unfortunate machine guns attempting to join their regiments and battalions again in the confusion of victory or defeat. Of course in thinking out these things we are obliged to bring such practical considerations as these to the front as well as theoretical ones. To those who have read the accounts of modern European wars, it appears quite possible that the poor little machine guns would not find their own battalions till some days afterwards. In the foregoing pages I have been treating almost exclusively of warfare against civilized nations in the fairly open country where it is usual for campaigns to take place.

In fighting in uncivilized countries against savages these proposals would have to be largely modified according to the practicability of the country and the nature of the savage tactics. For instance, against such foes as fanatical Arabs or Zulus who almost invariably act on the offensive, thus causing us to act on the defensive, the offensive power of machine guns is not required to be made much use of. In addition to this the barren and impracticable nature of the country usually compels

the number of transport animals to be cut down to the lowest possible limits, and the short duration of fights against charging savages renders it unnecessary to have so large a supply of ammunition with the gun. Therefore, we must have an equipment suitable to these changed conditions. If pack transport alone can be used something in the nature of mountain battery equipment would meet the case, and the guns would have to be lighter and less powerful. As the ranges at which these sort of fights takes place are usually short, the inferior accuracy of these light weapons at the longer ranges would be of little consequence. It would be advisable, however, whenever the nature of the country permitted it to have the guns and ammunition drawn on wheels on account of the consequent saving in animals, and as they would usually be used on the defensive it would not be so necessary to give them the great rapidity of movement which is so useful in civilized warfare.

Captain W. N. Lloyd, R. A., organized a troop of four Gardner guns on the mountain battery principle during the recent operations in Burmah, and an interesting account of the equipment of this troop was sent by him to the Royal Artillery Institution papers some months ago. In it he recommends for the four guns an establishment of fifty-two officers and men besides a native establishment for the mules. This, he remarks, is about half the establishment required for a 4-gun mountain battery. He points out the great value of the machine-gun fire for searching out the position of the dacoits in the jungle and for playing on their line of retreat when driven from their stockades or villages, and I have General Sir G. White's word for it that these weapons did good service when called upon.

In conclusion, I would point out that it is of little use our writing and talking about machine guns and making proposals for their equipment and tactical use, unless we take measures to have these proposals tested by experiment as far as can be done in time of peace. It is also of little value trying one gun here and another there without any attempt at making them work together. What we want is to try their combined effect under service conditions and at targets representing such objects as would be fired at on service. Moreover, the N.-C. O.'s and men must have some preliminary training before conducting any experiment, in order to make a fair trial, and trained range-finders must be supplied, for without them there is considerable difficulty in finding the range on damp soil or turf, though on dry soil the dust knocked up by the bullets is sufficient guide. This difficulty in finding the range is no doubt the chief bar to the efficiency of machine-gun fire. To obviate it perhaps some small gun firing an explosive shell might be carried and used to find the range just as common shell are used with artillery. With the equipment and training of men complete we could compare the effect of machine-gun fire with that of infantry and artillery at the various ranges, and from the results obtained get a more correct idea of their value in the field, whether used singly or working together. In

order to accomplish this I have the following suggestions to make: There are a large number of 4-gun batteries in the artillery armed only with the obsolete 9-pdr., which we may be pretty sure will never again be sent on service. Suppose these guns be taken away from one of these batteries for a time, and machine guns supplied in their places; there would be sufficient horses and men in one battery to fit out two machine gun troops for experimental purposes; after a little training a regular series of experiments might be carried out as far as possible under service conditions against targets representing troops of all arms and in various formations, men in shelter trenches, etc. This experiment would cost little beyond the fitting up of the guns and carriages and the expenditure of ammunition, and could not but be most interesting and valuable in its results.

In advocating the use of machine guns in the field, I wish it to be distinctly understood that I do not consider that they can supply the place of either infantry or artillery, except under certain conditions, but that by their own peculiar power at certain ranges they may decide a battle in favor of the army which possesses and knows how to use them. I, therefore, do not advocate their introduction at the expense of reducing any other arm, but am of opinion that they should be brought in in addition to the other arms.

I will now conclude by reading an extract from the official report by the District Inspector of Musketry on some machine-gun field firing which has recently taken place at Aldershot. The first extract is from a report on the mounted competition at the Army Rifle Meeting, and is as follows:

"In the mounted competition of this meeting a section of four men were required to ride over a course of about 800 yards over four fences, three men being required to dismount at points 600 and 400 yards from the target and fire four rounds, and each section was allowed seven minutes to complete the course. As the cavalry Nordenfelt machine gun has three barrels, and the gun is served by three men, it was thought that, by putting the guns over the same course as the mounted sections, an interesting and useful comparison could be made between the two descriptions of fire.

"The best mounted section recorded 21 hits on the target out of 24 rounds fired. The best machine gun recorded 3 hits out of 80 rounds fired.

"The cavalry guns were fired from galloping carriages without removing the horses. The very bad results are attributable to the movement of the horses, and prove very decidedly that, so long as horses are attached to the gun, effective fire cannot be produced.

"The infantry machine guns were put over much the same course and allowed the same time; the result of their practice was very good, viz., 49 hits out of 80 rounds; in their case the mule was detached from the gun when brought into action.

"The cavalry gun-carriage is provided with a centre pole and the infantry gun with shafts which rest on the ground when the mule is removed, acting as a trail to steady the gun."

I think this report fully bears out my opinion of the cavalry galloping carriage. If the infantry had only to unhook the trail from the limber instead of unhooking the mule they would have had much more time for firing, and therefore made still better practice.

I will now read an extract from a letter from Colonel Ward Bennett, commanding the 5th Lancers at Aldershot, to which regiment a 3-barrelled gun on a galloping carriage has been for some time attached. He says: "I disapprove of machine guns being attached to cavalry regiments, for a commanding officer has quite enough to do to look after 400 men and horses when manœuvring in the field without the extra responsibility of the machine gun." Then again he adds, "to fire a gun with panting horses attached is an absurdity, so that a proper carriage is essential, and the present two-wheeled one is useless." Here again I think my views are supported.

DISCUSSION.

Colonel the Hon. R. A. T. TALBOT, C.B. (1st Life Guards): It is probably well known that the only real and exhaustive trial of machine guns that has taken place with cavalry is due to the exertions of Colonel Liddell, a gun having been attached to the 10th Hussars for the last two years. It is owing to those experiments that many improvements have been made in the present gun-carriage, and in various matters connected with the gun, which could not have been effected without a practical trial. I will endeavor, as briefly as I can, to give my views (which are mainly in accordance with those of Colonel Liddell) as to the lecture given to-day, confining my remarks chiefly to the use of these guns with cavalry, because I think there are many officers present more competent than I am to discuss their use with other branches of the service. I therefore turn at once to the remarks the lecturer has made as to the use of the gun with cavalry. He says first of all: "It is intended to be fired without unhooking the horses, by two men on the limber." Now, I think that is not altogether an accurate statement. It is not intended always to fire without unhooking the horses from the limber, but on occasions it might be so. Where there was time, undoubtedly the horses would be unhooked from the carriage, with the object of putting them under shelter, and also that the gun might not be affected by any movement on the part of the horses, although the disadvantage of such movement had been very much modified by the prop which Mr. Nordenfelt had added, which made the carriage almost steady, even if the horses were not motionless. I therefore think it ought to be considered that as a rule the horses would be unhooked from the gun. The first objection taken by the author to the two-wheeled carriage is, "That sufficient ammunition cannot be carried, probably not more than 2000 rounds at the outside, which would not last more than six or seven minutes in rapid firing." In the first place, I do not see that it need be put at 2000, because I can see no objection at all to having a subsidiary carriage for carrying the ammunition, and as much as 10,000 or 15,000 rounds might be so carried. But if it were so, I think there can

be no dispute as to the enormous importance of being able to bring a very heavy fire to bear for six or seven minutes, even if it could not be prolonged. I have already touched upon the second objection, that "The motion of the horses would impair the accuracy of the fire," because, as I have said, the horses would not be as a rule attached to the gun when firing. The third objection raised is, that "Supposing the horse was hit, the gun would be put out of action till the horse was extricated." That also is met by the fact that the horse would probably not be in the carriage. Of course under every circumstance accidents may happen, even in field batteries, but if only one horse is hit and you have your other horse sound, he would be quite competent to take the carriage out of fire. There would also be the corporal's horse, no doubt provided with traces. Probably the regiment would not be very far off, and would be able to provide a trace horse or horses (with lasso equipment), and so you could take the gun away almost as quickly as if it had its complete team of horses. The fourth objection is, "The gun cannot be detached from the limber to be run up into a position." I cannot see the force of that objection at all. Two or three men can readily move one of those light guns, but the horses before they were detached, naturally would take it up to the position, and then if it was only a question of a few yards, the men could easily push it into its proper place. The fourth and fifth objections depend very much upon the lightness and mobility of gun and carriage, and with a light gun on a two-wheeled carriage almost disappear. The fifth objection is, "The difficulty in getting cover for the gun thus mounted, when it is used in defense of positions." I think the lecturer answers that himself by the later part of the paragraph, in which he says: "The extra height would enable it to fire over a higher parapet, which would give more cover to the men." My opinion about this gun is, that its most essential feature is its mobility, and anything that sacrifices or impairs that quality reduces by so much the efficiency of the gun. I attribute greater value to mobility than to weight of fire, or even to extreme accuracy. The great thing is, that it should be able to keep up with cavalry, to go forward and take up its position, or to retire from that position with the same rapidity with which it took it up. Although I do not wish to go into the technical matter as to which particular pattern of gun is desirable, I think this feature ought to be borne in mind, that lightness of gun and carriage is one essential qualification. In a later part of the lecture, Lieutenant Benson says: "Imagine a cavalry regiment sent off on reconnoitring duty over very rough country, which, though passable for horses, was so in a much less degree for wheeled carriages." From what I have seen of machine guns there are very few places indeed which the gun could not go over, and I think that objection is really not a very valid one. We all know the marvellous manner in which horse artillery guns are able to go over the country, and of course from their lightness and hardiness, being between two wheels only, machine guns would be enabled to go over places where certainly horse artillery guns could not go. The lecturer has so very fully gone into the various occasions upon which this gun could be most usefully employed, that I do not propose to go into that part of the question. I think his remarks are very exhaustive on this point. It is almost impossible to overrate the enormous importance of the position which these guns may take in future actions where cavalry are engaged, and my opinion is, that their part is with cavalry more perhaps than with infantry or artillery; although with the latter the necessity of a cavalry or infantry escort would often be obviated. I

may say this, that I think in the case of infantry attack, machine guns would be of very little use, but where cavalry is attacking, they might be of use. But with all arms, for covering retreats, and for protecting important positions, such as bridges, temporary entrenchments, and for detached duties, I think the value of these new weapons can hardly be overrated. There is, however, one point on which I must rather differ from the lecturer, and that is where he advocates the formation of these guns into troops. Those who heard what the Adjutant-General said this year as to the great difficulty he had in getting the War Office to sanction increased expenditure, even in matters of paramount importance, will see that that is a very considerable drawback to the idea of forming batteries or troops of these guns; but by attaching one or two, or more guns to each cavalry regiment, there would be absolutely, in time of peace, no additional expense, except that of the gun itself. That point should be taken into consideration, whether it would ever be possible to induce the War Office to establish what would be practically a new branch of the service, with its attendant expenditure; but there would not be the same objection to allowing guns to be attached to each regiment. On active service these machine guns would of course be at the disposition of the corps or divisional commander for employment in any way that might be thought proper.

Major W. W. M. SMITH, R. A.: My only title for speaking on this subject is this—I have not had actual experience with machine guns, as the lecturer has done, in the battle-field, but it is a subject to which I have given a great deal of consideration, and it so happened that last summer, when a great many miles away from here, about the same time that I suppose the lecturer was preparing his address, I was engaged in writing a paper of my own upon this very subject. I regret that the Council of the Institution have, as I understand, felt it right that this particular discussion should now be drawing to a close. They have undoubtedly assigned a great many days during this and previous years to the subject, but it would appear to me probable that among the many useful purposes which the Institution serves, a thorough discussion of problems of this kind, particularly when they are approaching an immediate solution, is perhaps the most urgent of all its duties; and therefore I think, until the subject has been probed to the bottom, it is very desirable that the controversy should still proceed, whether in the printed pages of the Journal, or in this theatre. I am very pleased to see, having examined the question, *à priori*, from an altogether independent point of view, that my conclusions are almost exactly identical on the more important points than those which Lieutenant Benson from his fuller and riper experience has been able to form. There are, however, one or two matters on which I am entirely at issue with him. In the first place I imagine his view is, that the future "batteries" or "troops" are to be divisional units, just like the three batteries of divisional artillery at the present moment. Of course there is a great deal to be said for that view, if it is only as a protest against the view advocated by Major Anderson and others, that machine guns ought to be regarded as an integral part of a battalion of infantry, even to the extent of posting them to individual companies. I think the lecturer's suggestion a good one, but that it has gone too far. In the future organization of the new arm (for it is little less), I believe there are a Scylla and a Charybdis to avoid; and if the Scylla is the attaching of a separate machine gun to each company, the Charybdis is surely the attaching of separate units to the Division. In my opinion the machine gun ought to act with the brigade of infantry. I

differ entirely from the last speaker in his view, as I understood it, that the use of machine guns is more strictly that of an auxiliary to the cavalry than to any other arm of the service. I believe that they are more suitable to infantry; and that the better plan would be to put a certain number of these "troops" or "batteries" under the immediate orders of the brigadier commanding the infantry brigade. The immediate support of the infantry is the most urgent of all the wants of our present tactical system. The infantry is the arm of the service which is told off to carry an enemy's position or to defend one of its own; and the more closely our new organization subordinates the action of the new weapon to the urgent necessity of supporting the infantry in both the attack and the defense, the more useful and striking result we will get. I am a little bit at issue with the lecturer as to machine guns in the new organization being employed in addition to the other arms. I agree with the last speaker that we do not sufficiently realize the limiting conditions which are binding upon us with regard to the suggestions that we have to make, one of the most rigid of those being that we are not to propose anything which involves any very large amount of expenditure without indicating such financial compensations as would result from its adoption. Now, if every officer who has any important innovation to propose, were to endeavor to show how its adoption would lead to economy in other directions, and how by its means certain other arms of the service might be reduced within certain limits we should obtain, I believe, more certain and practical results. If we employed a certain number of machine-gun batteries with brigades or divisions, I think it would not be a very difficult matter to show that a certain portion of the other arms might safely be reduced, and to such an extent, I firmly believe, as to show a very distinct economy, combined with a marked increase of efficiency. Next, with regard to the weight of the gun, and the number of horses, I think the lecturer has made possibly this mistake. He starts with the assumption, which is no doubt, correct, that the ten-barrelled Nordenfelt is a very much more efficient weapon than the three or five-barrelled, and therefore that our future machine gun is to approximate in power and weight to this standard, with the consequent deduction that with the ten-barrelled Nordenfelt, four horses will be required to draw it. I think that in doing this he has conceded a very great advantage to the enemies of machine guns, but if he could draw up an equipment which will only require one pair of horses to each weapon, the gain would be very great indeed, and would go a long way towards conciliating those who are opposed to its introduction. I believe such a design to be perfectly practicable. I think it is quite possible to have a very efficient weapon on a four-wheeled trail and limber carriage drawn by two horses, weighing between 16 and 17 cwt., inclusive of the weight of two or three gunners, and capable of being manœuvred at a gallop. If you can achieve that it seems to me that the gun, in a tactical point of view, will be nearly perfect. The target which a two-horse four-wheeled carriage would present to the enemy's fire would be very much smaller than that which would be presented by the four-horse carriage which the lecturer has advocated. I think we ought to make the tactical desiderata the real basis of our future organization. The weight of our guns must be the consideration which governs all others, and therefore, if the lecturer had commenced with the future tactics of the new arm, and worked out, *à priori*, from that stand-point a suitable weight and number of horses, he would have arrived at a result which would have given us a more certain efficiency, and would have commended itself more fully to the

minds of this audience, while making no extravagant demand on the adaptive power of the inventors. I will just mention the results that I have arrived at. I estimate that for a nine machine-gun battery we should require something like 75 to 80 horses and 130 men. That is very much more economical than the scheme drawn up by Lieutenant Benson for the same number of guns, which would employ something like 130 to 140 horses.

Lieutenant BENSON : It is seventy horses for a four-gun battery.

Major SMITH : Mine is a nine-gun battery, and requires from 75 to 80 horses and 130 men. With all that Lieutenant Benson has said as to the value of the arm, or with the greater part, I most cordially agree. He spoke about the enormous value which the machine gun would have, if suddenly brought up at the critical moment, but I think he had rather in view that if the infantry suddenly failed or met some unforeseen emergency, the machine guns would come up to its support. I go a step beyond that and think, that, even when the infantry which is engaged in the attack of a position is not immediately assailed, when the supreme critical moment of the engagement takes place, when it is a question of moments whether the attacking or the defending infantry is to retire, that is the very time when, under cover of the smoke, machine guns may gallop up, place themselves, if necessary, even in the midst of the shooting alignments and render most overwhelming moral and material aid. I trust that the paper will give the *coup-de-grace* to certain proposals which have been previously discussed in this theatre, one of those being the idea of affiliating the new arm to any one of the existing arms. I believe that to be the greatest of all errors, and for that reason I rather deprecate the lecturer's proposal that a machine-gun battery should temporarily, for experimental purposes, be assigned to the officers and men of one of the existing 9-pdr. four-gun batteries of artillery. The officers and men of my own corps, very much as I value their military qualities, after all have regimental traditions of their own like others have, and even if their tactics are not influenced by traditions, I think the experiments would to a certain extent be discredited by the mere fact that artillerymen conducted them exclusively. The way to initiate the experiment with the new arm would, I submit, be to form an altogether new school of the arm at Aldershot or elsewhere, with representatives of every existing arm in the service on its list, and provided with a certain number of weapons and horses, and then to let them work the thing out from a totally independent standpoint. Such a school would be a nucleus from which the future corps of machine guns could be formed.

Captain STONE, R. A. : I have very few remarks to offer, but they will rather bear upon what the last speaker has said with regard to the mistake which has previously been made—of course, I speak under correction—of attempting to affiliate the machine gun to any particular branch of the service. I agree with Lieutenant Benson as to the objections against mounting machine guns and ammunition on mules ; in fact, these objections have been already made sufficiently clear in the discussion which followed Major Anderson's paper. I think the system suggested by Captain Armit and others is equally open to objection, and I am sure that the idea of attaching them to the cavalry is opposed by many who have considered the question. I believe that the feeling at Aldershot, in the cavalry, is very much against the gun being attached to that branch of the service. I cordially agree with Lieutenant Benson in his suggestion that machine guns should be mounted on a light gun-carriage with a trail, in order to get the maximum mobility and steadiness, and I hope to strengthen his posi-

tion by the remarks that I have to offer. Taking Lieutenant Benson's organization of a troop of four Nordenfelt guns with small-arm ammunition carts, we have fifty men and sixty-two horses—a somewhat large number. However, it will be sufficient for my purpose if I consider a single ten-barrelled Nordenfelt, mounted on a field-carriage carrying three men on the limber-boxes and 5000 rounds of ammunition, and drawn by four horses, with a driver on each of the near horses, and one non-commissioned officer in charge (mounted), the gun being capable of delivering its fire at the rate of 1000 rounds a minute. I hope to show that it would be far more economical to introduce troops of machine guns, as Lieutenant Benson proposes, than even he imagines. The newest machine gun, known as the Maxim Automatic gun, which has been so eagerly taken up on the Continent, and with which we are, I believe, experimenting, while other nations are arming themselves, is a one-barrelled gun weighing 50 lbs., in which the recoil of the barrel does the whole of the work which is performed by hand in other machine guns. It consequently requires only one man to manipulate it. The gun is mounted on a carriage with steel plate wheels and a vertical steel shield, the wheels being movable on a pivot, so that when in action they give, in conjunction with the shield, perfect cover to the man working the gun. The gun thus mounted can be wheeled along by two men, or, if attached to a limber containing 5000 rounds of ammunition, can be manoeuvred at a gallop by two horses with one driver on the near horse and two men on the limber-boxes. Then we come to the question of mobility, and, in order to have perfect mobility, that is to say, to be able to move at a gallop, you must have, so far as I can see, two horses, with the driver on the near horse, and to be able to manoeuvre the gun just in the same way as with the horse artillery. In working this out I find the following comparisons. A gun thus mounted, if attached to a limber containing 5000 rounds of ammunition, which is the same amount given by Lieutenant Benson for his limber, can be manoeuvred by two horses and one driver on the near horse, and two men on the limber-boxes. One of these men might be a non-commissioned officer; but that is a matter of detail. The gun only requiring one man to fire it, one man is really sufficient, but two men, a non-commissioned officer and a gunner, would be more than sufficient for all purposes. The gun fires from its one barrel 600 shots a minute, and can continue for any length of time without heating. We have, therefore, the following comparison:—With the Maxim gun, *i. e.*, without the ammunition cart (which will be the same in either case) the gun and limber, two horses, two gunners (one being a non-commissioned officer) and one driver as against the Nordenfelt system which, according to Lieutenant Benson's propositions, has five horses, four men (including a non-commissioned officer) and two drivers.

Lieutenant BENSON: What is the total weight of the limber?

Captain STONE: I forget exactly. Curiously enough, I find that Mr. Maxim is sitting next to me, and he will be able to give you that. I have worked it out and I find it is considerably less than two horses have been in the habit of drawing as their share of the weight in a field or horse artillery gun-carriage; so that I think I am justified in my conclusions. The amount of ammunition carried is the same, but the Nordenfelt fires 1000 rounds in a minute from its ten barrels as against the 600 rounds from the one barrel of the Maxim. Now, without going into the entire personnel of the machine-gun troop, but taking only the strength of each subdivision—not taking the ammunition cart—and

multiplying it by the number of subdivisions, let us compare a troop of six Maxims and a battery of four Nordenfelts. I find that for the Nordenfelt troop we have 20 horses, 16 men, 8 drivers, 4000 rounds per minute, and 20,000 rounds carried on the limber. With the Maxim we should have 12 horses, 12 men, 6 drivers, 3600 rounds per minute, and 30,000 rounds carried on the limber—a very much larger number of rounds carried, a difference only of 400 rounds that you have to deliver in a minute, which, I think, is unimportant and a saving of very nearly half the horses—12 as against 20, 12 men as against 16, and 6 drivers as against 8. But perhaps the most important point of all is the very much larger amount of ammunition that would be carried with the smaller number of horses, owing, of course, to the very much greater lightness of the gun. I think this striking comparison of figures will much simplify Lieutenant Benson's scheme for organizing the machine guns into troops as soon as we are in possession of a sufficient number of Maxim guns to make the experiment, as it appears to me that two of the principal difficulties which have confronted us hitherto can be swept aside, viz., the apparently disproportionate amount of transport required for the results achieved, and the great cost of organizing such transport. There is one technical point which I should like to see settled, and that is the difficulty of getting the range by trial shots on certain natures of ground. In the Maxim gun this can be done approximately by a clever sighting invention; the sight consists of a pair of calipers so adjusted that when the object (say a man) is, so to speak, visually gripped, by lessening or increasing the interval between the calipers according as the range is less or greater, the elevation necessary for that range is given mechanically by an arrangement worked on a curve representing the trajectory of the gun, and set in motion by the screw which moves the calipers. So that the very fact of gripping your object gives the necessary elevation to the gun. With regard to the error, I have worked that out most carefully, and, as Lieutenant Benson says, the most useful range for the machine gun would be a sort of link between the artillery and the infantry; that is to say, between 1000 and 1500 yards. I find the error between the 1000 and the 1100 yards—a difference of 6 inches in the estimated height of the object—would only lead to an error of 20 yards in the range. At a range of from 1400 to 1500 yards an error of 7 inches in the estimated height of the object will give exactly the same error in the range—that is, 20 yards.

THE CHAIRMAN: With regard to the calculation of weights which you have given, and which is rather important, do you derive it from a comparison with other carriages, or from what the horses can draw?

Captain STONE: It was derived from a comparison of the weight of the horse artillery and the light field artillery gun-carriage with limbers all ready for service, full of shell, with the men equipped in marching order, and drawn by six horses. I took one-third of that weight as being permissible for a pair of horses.

THE CHAIRMAN: Did you take into consideration the necessity of the case that there are four wheels with a certain bulk of material necessary to enable it to withstand shock in going over ground? The method you have indicated seems to me so very likely to lead to disappointment in the end, that I mention it, because there are certain necessities of carriage which have to be considered.

Captain STONE: I have taken it as less than one-third of the weight of the

ordinary service carriage.* In conclusion, I may say I think Lieutenant Benson's suggestion to work the machine guns as a separate arm is the first practical step in the solution of an obstinate problem, and, if not trespassing too much on his preserves, I would venture to add that the officers should be specially selected from cavalry, artillery, and infantry, as well as from the staff, in order that the varied requirements of the machine-gun troop may be intelligently met and its action in no way hampered by a too narrow appreciation of the tactical issues at stake.

Lord CHALMSFORD: Being the only military member belonging to the Council present, I should not like to allow this lecture and discussion to pass without saying a few words. I think that the Council has reason to congratulate itself upon the lecture which has been delivered to-day, and I am quite sure we all feel very much indebted to Lieutenant Benson for the very able manner in which he has dealt with this very important point. The way in which the advocate of the cavalry and the advocate of the infantry have both maintained that the weapon should be attached to their respective arm is, is, I think, a very strong argument in favor of Lieutenant Benson's idea that it should not be attached to either. I must say, speaking as a general officer, that I think there would be a very great advantage in having this arm as a special unit attached either to a brigade or a division, equipped and organized so as to be used to the best possible advantage, wherever the general officer may think best. No doubt at times, I quite admit, the cavalry may require a weapon of this description, when it might do right good service. Lieutenant Benson forcibly points out the disadvantage of the weapon being attached permanently to any of the three arms, as except on particular occasions it would hamper instead of assist them. When not attached to any particular arm, the general officer could keep these weapons in reserve, and would be able to use them in the manner best suited to assist his general plan of operations. Lieutenant Benson has been obliged to use the word "Nordenfelt gun" because it is the one which he himself has seen in work. I trust that this will not lead to a discussion upon the relative merits of these guns. We are met here to discuss the broad question as to their organization and their use in the field, and it would be, I think, very injurious to the interests of the discussion if we were to diverge into the relative merits of machine guns. There is one point which it is decidedly right should be discussed, and that is whether a heavy machine gun has an advantage over a light one, and also with regard to its equipment. I think myself that Lieutenant Benson makes out a strong case for the heavy gun, because it can be taken at speed over much rougher ground than the lighter one, with less risk of being upset, and with less chance of injury to the weapon itself. With regard to the

*On referring to the calculations which I made for the purpose of making the above comparisons, I find that I have really understated the case for the Maxim gun.

Taking the weight which six horses can draw, at a gallop, as 37 cwt. (weight behind team in 12-pdr. gun), we have about 12 cwt. as the proportion for each pair of horses.

Weight of Maxim gun and carriage	1½ cwt.	} These weights are approximate.
1336 cartridges in four boxes on gun-carriage	1½ "	
Weight of limber	1½ "	
4008 cartridges in 12 boxes on limber	4½ "	

Giving a total of 5344 rounds, and a weight behind the horses of 9 cwt. or three-fourths of the share of work which falls to each pair of horses in a gun-team. I think the margin is sufficient to meet the Chairman's interpolation. The wheels are of hickory; the axle and trail of tubular steel.

organization, I contend that it ought to be a separate unit. Of course, as one of the speakers has already remarked, there is the question of expense, but let us argue the matter merely from the abstract point of view, and let us believe that the War Office will be sufficiently patriotic to give us the best possible organization, provided we can prove that it really is the most efficient. Then with regard to the tactics, I do not think there is any necessity to discuss the use of the machine gun in the defense of a position or of a fortified post. That is perfectly well established. But with regard to attack and how machine guns are to be used, no doubt very important points are raised. The infantry now-a-days, with far-reaching and precise rifles opposed to them, have a very difficult task indeed when they have to advance and attack a position, and any assistance they might receive during that advance would no doubt be of enormous value. I do not see any reason why that assistance should not be given by machine guns, although they are not attached absolutely to the infantry, quite as, if not more effectively than, by the artillery. The artillery take up a position at a considerable range, and having obtained that range are able to pour their fire into the enemy's line, and the machine gun can be employed in the same way. But there is one important advantage which the machine guns have over the artillery at one particular period of the attack, which has not been touched upon by the lecturer. When the infantry get within about 800 yards of the enemy's line, the artillery cannot assist them any longer without firing over their heads. Now I believe it has been perfectly well established by all writers on tactics that there is nothing that shakes infantry more than the fact that their own artillery are firing over their heads. It is a very disagreeable sensation; fuses will not always burst the shell at the right moment, and any shell coming amongst infantry from their own side does more to shake their steadiness at the critical moment than any fire from the enemy. That disadvantage, however, does not apply to machine guns. Supposing you can place your machine guns in position at 1200 yards from the enemy, having a good command, the bullets that go over the heads of your attacking infantry would not be distinguished from those coming from the enemy's side, and therefore the infantry would get efficient support without any disturbing influences. In such a case I think the machine guns could give infantry most important support at a time when artillery would be quite unable to do so, without perhaps doing more harm than good. I would venture, in conclusion, to say that I believe artillery in position might often receive very effective assistance from machine guns. Artillery has often to take up exposed positions to protect the flank of infantry advancing to the attack; they are consequently often exposed to attack from cavalry, or even from infantry. Machine guns, temporarily attached to batteries so employed, might enable them to remain in action, and prevent them from being severely handled by a counter-attack. Such service would be certainly very much appreciated by that arm, and would add much to its efficiency.

Mr. MAXIM: I fully agree with the author in what he has said about the difficulty of accurate firing of machine guns from "galloping carriages." You can make moderately good shooting from the back of a horse, provided the rifle is perfectly free, but if the rifle and the horse were fairly secured together, and the relative position of rifle to horse were regulated by screws and gearing, it would be exceedingly difficult to make good shooting. So with a gun mounted on a platform, one end supported by wheels and the other by a frantic horse, I

can conceive it would be an exceedingly difficult matter for a man to shoot well with the gun firmly screwed down to its platform as it must be if it is operated by hand. If a gun is operated by hand it necessarily requires some considerable force to operate it ; it, therefore, cannot be free to turn in every direction, as it would participate in the action of the handle. It has to be screwed down to something and aimed with gearing ; in order for the gun to be pointed screws must be turned, and it would, therefore, be exceedingly hard to do any kind of shooting from a platform which is constantly moving, the relation between the platform and the gun having to be constantly changed to counteract the movements of the horse. The machine gun which I have made, and which has had many competitive trials, weighs but 50 lbs., and does not even require screws or training gear. Some speakers have referred to the necessity of a heavy mounting. I may say that the automatic gun being self-contained, requiring no external power to operate it, has very little tendency to move while firing. A man can lie down on the ground and fire it in the same manner that he can fire a rifle. He can have a box containing several hundred rounds of ammunition beside the gun, and by once pulling the trigger he can fire the entire box without any mounting at all. There being only one barrel there can be but one shot fired at the same time ; the strain is, therefore, very light, and a very light carriage can be used, and absolutely without training-gear, except you wish to fire at a target at a long range. I find that the gun being light and requiring an exceedingly light mounting, I can afford to use a shield, the weight of the shield attached above the gun being about 60 lbs. My two shields combined weigh less than 100 lbs., and this carriage with both shields weighs no more than 200 lbs., so that one is able to carry into action 1300 rounds of cartridges attached to the carriage itself. I find that the weight of the cartridges and the shields steadies the gun and enables one to do most extraordinary shooting. For example, in France the weight of the cartridges and shield together so steadied the gun that 80 per cent. of the shots went into a target 2 feet square at 800 metres, and the French officers said at the time they were unable to account for the extraordinary accuracy of fire. If any of you would like to see this exceedingly light carriage I would say that I believe both it and the gun are on the premises.

Lieutenant-Colonel ALT : The paper we have heard read is, I consider, an excellent and exhaustive one ; but I cannot concur in the conclusions the lecturer arrives at. Being an artillery officer he naturally thinks on horseback, and considers that machine guns are not capable of being worked with advantage by infantry, but should be mounted on horse carriages organized in troops of four guns each, and be attached to each division of an army corps. He gives his reasons against their use by infantry under three heads, to which I propose briefly to reply. With regard to the enormous labor of dragging these guns in a campaign, I can only point to what the men of my own battalion have done regularly with the Easter marching column, and at the Aldershot drills, for several years past. The 5-barrel Nordenfelt guns mounted on our magazine carriage have been dragged from Petersfield to Portsmouth, from Canterbury to Dover, from East Grinstead to Brighton, from Aldershot to Pirbright, and back on a bee-line across the Fox Hills, and the Long Valley, with its ruts and dust, is as familiar to our gun detachments as Oxford Street to a London cab-driver ; no high-roads, by-roads, country paths, hills, or downs encountered on the way, have checked their march. Our men never complain, except at the indignity

of it being proposed to relieve them, and only accept assistance when breasting a slippery slope, impracticable for artillery, or a steep incline on a heavy or newly-metalled country road. Any loss of distance under such circumstances is more than picked up at the double on the down grade, and by the time the battalion is in attack formation the guns are always in position to take part in the fighting line. If we can do this in the Volunteer service, Tommy Atkins is not the man I take him to be if he mutinies against being called upon for similar work in the Regular service. With regard to ammunition, our magazine carries 5000 rounds, and each man of the gun detachment 100 rounds, making 6000 rounds available for each gun the moment it comes into action. The replenishment of this supply in action is a simple matter of detail. With regard to hand draught giving the least possible mobility, I have already shown that our guns keep up with the battalion under all circumstances, which is all that should be required of them; but if additional proof were wanting of their mobility, I may mention that one of the guns, with the usual detachment, has occupied a bridge two miles to its front, and come into action in nineteen minutes; and for getting across difficult country for a similar distance, I would like to back one of my hand-drawn carriages against one of Lieutenant Benson's horsed wagons with limber. What I mean is going straight across country by-paths, fields, over banks, ditches, hedges, anything that came in the way. I claim for the hand-drawn gun all the advantages of machine guns so ably pointed out by the lecturer, with the additional advantage that they form a much smaller and more difficult to be distinguished mark for the enemy's artillery and infantry than any other system; it being very hard to distinguish them at any distance, on certain grounds and in the smoke of action, from a cluster of skirmishers. With two guns attached to each battalion a brigadier or divisional general could mass his machine guns if occasion called for it. I do not think that my battalion is weakened by the detailing of the necessary detachments to work the guns, but that confidence is rather imparted to it by having its flanks covered by those weapons, and by the general feeling of security their presence imparts to the rest of the line; and I do not find they get any more out of my control in practice than the companies of a battalion in extended order or detached for outpost work. I should be pleased to see machine guns attached to each branch of the service, but I contend that as they are but clusters of rifles their proper place is with the infantry. I contend also that they should be mounted upon a single magazine carriage to be drawn by hand without being encumbered with shafts or separate limbers, which are impediments which I found to interfere altogether with the effective working of the guns, and which might with reason be complained of by Tommy Atkins, if he were given machinery of that sort to manipulate. It appears to be the general feeling of the meeting that these guns should be horsed and worked in batteries. And with reference to Lord Chelmsford's remarks as to the firing of machine guns over the heads of infantry not resulting, as with artillery, in shells sometimes dropping upon your own men, I may suggest that there are such things as defective cartridges, which sometimes fall short, as I have found to be the case with field-firing experiments at Aldershot, and it would be just as startling to men advancing across country to find a few bullets coming into their rear as it would be to have shell bursting short over their heads. I was glad to hear Major Smith admit that these mounted guns might gallop up at a given moment and take part in the fighting line, but it appears to me that if I

can sneak up my machine guns with the fighting line my non-commissioned officers or subalterns attached to them can judge much better as to the best position to be occupied than one of these flying batteries, dashing up in the heat of action to take up a position; and I think my guns would be much better able to produce the effect which it is desired to demonstrate could be obtained by the flying battery. Time prevents my touching upon statistics with regard to weights, number of men and horses, etc., and I therefore conclude by tendering my personal thanks to the lecturer for his valuable contribution to the subject of machine guns.

THE CHAIRMAN: Do I rightly understand you to advocate machine guns being galloped up?

Lieutenant-Colonel ALT: No; I say I can get across an ordinary enclosed country on a bee-line as fast, for a mile or a couple of miles, as a horsed battery of machine guns would be able to do by having to keep to road or clear away banks and ditches to get through.

THE CHAIRMAN: I only interpolated because I thought you spoke with approval of what Major Smith said as to their being galloped up in front.

Lieutenant-Colonel ALT: It has been objected to machine guns that they could not take part in the fighting line, but I have always so worked my guns when necessary, both at Easter reviews and on field-days at Aldershot. I do not consider they would be likely to suffer more in that way than the individual men would be which formed the fighting line.

Mr. C. FREDERICK LOWE: At the lecture given on this subject in January of last year, when Lord Charles Beresford was in the chair, I called attention to the fact that General Gordon, in his diary written at Khartoum, in December, 1884, a few days before his death, said, "Against a good mitrailleuse, and a sharp operator with a good telescopic sight, no gun could be served with impunity at 2000 yards range, although it could be served against artillery fire, for at that range there is plenty of time to dodge under cover after seeing the flash ere the shell arrives." Now I am in a position to say that this very practical suggestion of General Gordon is fully endorsed by a distinguished and gallant officer occupying a very high position, and it would be interesting to learn whether the makers of machine guns have taken any practical measures to carry out this idea. Of course the theory formed by General Gordon as to the effect of these telescopic sights was founded on the experience of the American Civil War. Since the date of that lecture I have been favored by letters from officers and soldiers who took part in that war with telescope rifles which were manufactured in this country, and ran the blockade. The other day I got a letter from a colonel in the Confederate army, in which he said that when General Longstreet's corps was approaching Suffolk, in Virginia, in the early part of 1863, by one of the level roads leading to that place, the advance of the corps was discovered by a Federal signaller, perched on a barrel erected on the top of a high pole, like the crow's nest used by the Arctic voyagers, and who was seen signalling the Confederate movements to the Federal troops in his rear. Several of the sharpshooters of Longstreet's corps were armed with Whitworth telescope-sighted rifles, and one of them being called to the front was told to try a shot at the occupant of the crow's nest. This he did, and the man immediately disappeared below the edge of the barrel, and no more signals were given by him. In the advance then made the Federal skirmishers were driven back beyond the crow's nest, which was found

to contain the dead body of a soldier shot through the upper part of the body. The great distance at which he had been killed induced General Longstreet to have it measured, when it was found to have been 1300 yards. I have other letters from other officers in the Confederate service, and also from one of the men who carried one of these rifles through the whole war, giving similar details, and on the other hand there is a letter from an officer in the Federal service.

Colonel TALBOT COKE: I wish to say one or two words with regard to what the lecturer has said, namely, that it is during the time of peace that we should make experiments for war. During the two years that the battalion under my command has been at Aldershot, we have fully tested the machine guns, both on ordinary field-days and in the usual peace manœuvres. The first gun we had was mounted on pack mules, and I quite agree with what has been said, that it was useless when so carried. This year we have the sailor's carriage (such as is used by the Naval Brigade, drawn by one mule, and that carriage is also very faulty. I firmly believe that there is only one class of carriage that will ever really meet our military requirements, and that is the limber with the trail. I will not enter into the subject of weight, but I think it is a mistake to go from one mule to four horses. One mule has hitherto done our work with ammunition and gun on one carriage, and to jump from that to four horses is rather too long a step to be taken all at once. I should like to see the infantry gun with a limber and two horses. As to the concentration of guns in the field, I think that might be carried out by the brigadiers, even if the guns are with the various infantry battalions, and I quite agree with the lecturer, that for practical purposes they should be concentrated in the field.

Captain WALTER H. JAMES, late R. E.: Having some years ago advocated the question of a carriage from which the machine gun could be fired without unlimbering, I would ask permission to say one or two words on that subject. I am perfectly prepared to admit that the idea of a gun firing while retiring is somewhat of a utopian character, but if you concede that the machine gun is chiefly a horse artillery weapon, I think there are moments in the collision of hostile cavalry when a machine gun which can be fired, even though the horse do disturb its aim somewhat, will be of the greatest utility. The only other point to which I would like to draw attention is one which has not yet been alluded to by the lecturer, and that is the position that the machine gun occupies at the present moment, when a small-bore rifle is about to be introduced. The great object sought to be gained by using a cartridge of the same bore as the rifle was that it prevented the introduction of another kind of ammunition in the field, with all its attendant disadvantages. Granted, but when you come to this, that in a very short space of time you will find your infantry armed with a weapon, if I may judge from a recent General Order, of 0.298 calibre, it will be a very grave question whether for your machine guns you will retain the same cartridge, or whether you will not be able to get a much more efficient weapon by introducing a different kind of machine gun altogether. When the French introduced their mitrailleuse they used a much heavier cartridge than that for the rifle, and I do not know that there is any instance in the record of the 1870-71 war of failure of the ammunition supply. Therefore it may be conceded that it is possible to supply your mitrailleuse with whatever cartridge you determine shall be employed in it. This being the case, we have to consider what will be the best cartridge to give the machine gun in the future. One

difficulty with the machine gun is undoubtedly range-finding, but Lieutenant Benson proposes to attach a gun which shall be used for no other purpose than range-finding.

Lieutenant BENSON : And to be carried on the limber.

Captain JAMES : I will go further. I would propose the introduction of a weapon which can be used for range-finding and for fighting purposes in addition. We are all of us aware of the great stride made in rapid-firing guns of late, and it seems to me that the future best form of mitrailleuse will be something of this kind ; firing a shell which shall exceed the Geneva Convention weight, *i.e.*, over 1 lb., probably 2 lbs. or 3 lbs., which shall contain a high explosive fired with smokeless powder, with a muzzle velocity of 2000 feet. You would obtain a very different effect from a battery of these weapons to what could be got from a battery of rifle-calibre mitrailleuses ; they would not only possess man-killing power, but also battering power, because even the small charge, of say, gun-cotton, contained in those shells, which would probably be of steel, would have a fairly efficient battering character.

THE CHAIRMAN : Would they explode on impact ?

Captain JAMES : Yes, of course, with percussion fuses. I have come to this conclusion, therefore, that the new rifle cartridge is not adapted to the machine gun, because it is so very difficult to find out what it is doing ; that the advantages to be obtained from machine guns can be very much better obtained from a quick-firing than from an ordinary machine gun as accepted at the present moment ; and then I come to the point as to how these batteries are to be organized. I am distinctly of opinion that the cobbler should stick to his last. If you attach the machine gun to infantry or to cavalry, or to anybody but themselves, I think they will always occupy a secondary position. I am convinced that you ought to organize your machine guns in special batteries. Various propositions have been made of this kind. Some years ago a gentleman was good enough to suggest that they should be attached to the branch of the service to which I belong ; but I do not think that is a practical suggestion. I think they should be organized in batteries, such as have been suggested by Lieutenant Benson, or as was suggested in this theatre a great many years ago, just after a committee inquired into the use of machine guns in the field. What should these batteries be attached to ? I think they should form special reserves under the divisional commander. I should be almost inclined to go even higher in European warfare, and say the corps commander ; that a corps commander, taking our present army corps, should have perhaps twelve of these rapid-firing guns attached as one battery, and in addition to that I think it should form the main weapon of the horse artillery attached to the cavalry. It would take too long for me to go into the special tactical uses of these guns ; a heavy, rapid, and continuous fire from such a battery as I suggest would, I think, be much more efficacious than that from any mitrailleuse merely firing the infantry bullet of the future.

Mr. NORDENFELT : I wish to be allowed to protest in a gentle way against one remark of Lieutenant Benson's, *viz.*, the last remark he made about the firing at Aldershot. It is quite true that on one particular day the guns did not hit well, although on the previous days they had done very well. Major Mecham, the musketry instructor at Aldershot, and the officers of the regiment, had trained the men very perfectly with dummy cartridges, but before that trial I believe they had not fired any ball cartridges, except a small number on one

day previously. It is necessary for men to be trained for machine guns almost as much as for rifles, and I do not believe that any man who has only fired 300 rounds can suddenly set to work and hit targets at long ranges, indeed Lieutenant Benson admits that himself. The infantry carriage and the cavalry carriage have been made with a view to mobility. When Lord Charles Beresford came back from Alexandria, he told me that he did not see why we could not arrange guns to act like torpedo-boats ashore, and it was entirely due to Lord Charles Beresford that I commenced to push forward these galloping carriages. Since then Colonel Liddell, Major Wilson, and Captain Baden-Powell have been working for months with these carriages, and have gained a great deal of experience. At Aldershot the results of target firing have been sometimes good, and sometimes bad. Amusingly enough, some of my own men went down the other day, and fired very badly; in their great anxiety to fire quickly, they did not hit at all, whereas the disciplined men trained by the three infantry regiments made uncommonly good practice, in some instances at 400 yards making from 80 to 90 per cent. of hits. Although it is not for me to decide in what manner the guns should be employed, I hold with the lecturer that the mule can only be used in mountain warfare, but for this purpose I fully believe that the mule will be used, because there are many occasions when a light gun in mountain service will be found to be exceedingly useful; but it will have to be on a separate mounting, in the same way as in the case of other guns for mountain service. Next, as to the infantry and cavalry, whether the gun is to be used as part of a regiment, or as a tactical unit of a brigade or a division, I do not pretend to understand; but guns actually following the regiments or brigades on certain opportunities must be exceedingly useful, and must come into the armies. The guns will have in some way to be attached and organized so that the colonel and the brigadier-commander who needs them will not have to send a messenger half a mile to the divisional general to ask for them, because then they may never find one another again. The gun must be exceedingly handy; the opportunities given for its use may not last more than a minute or two, and if it takes five minutes to go and ask for the guns they may lose their chance, which might have been invaluable. That is the point on which I strongly urge the value of mobility. Mobility is a relative term. With an infantry regiment it means the speed with which the infantry can move at the double; with cavalry or artillery it means the speed at which they can go; therefore, I believe that the galloping carriage, with perhaps alterations such as have been described, or some other carriage, must be used for the machine gun. Lieutenant Benson has misunderstood one point. He says the horses are not taken out. The idea is that the horses should be taken out at longish ranges, when you are not under immediate and close fire, but that the horses should be left in the shafts at short ranges, when you suddenly come upon your enemy at anything between 200 and 800 yards. For that purpose, when your target is not a small target but a large one, I believe it will be found on extended practice that the movements of the horses do not seriously affect the gun. I say this distinctly, because if you take a target representing a squadron of cavalry, it will be about 9 feet high by 50 feet wide, and that target will be hit by a very large percentage of shots fired at these ranges, whereas if you fire at the Wimbledon target with a bullseye, you may not hit it with any large percentage of the bullets fired. The machine gun is intended to fire a rain of bullets falling for a short time, but the moment you begin to calculate mean deflections meas-

ured in inches, you may not have good targets. If you keep before your mind that the machine gun is not meant for that purpose, except possibly firing at a general and his staff at long range, you will never use it for accurate firing. but simply in order to throw a sudden and unexpected rain of bullets on your enemy, he not knowing where on earth they come from. Captain James spoke about the small-bore cartridge. This cartridge can only affect the machine gun in the same way as the rifle. If the cartridge is only two-thirds of the weight, that means that you can carry 50 per cent. more ammunition within the same weight. As to quick-firing guns moving rapidly, I am entirely of Captain James's opinion, but it has nothing to do with rifle-calibre machine guns at all. Machine guns are separate things firing rifle cartridges, and I am certain that the machine gun must be adopted into the service in connection with cavalry and infantry. I do not care whether it is a separate tactical unit or attached to regiments, but if clever gunners like Lieutenant Benson can possibly work up an interest in favor of having heavy guns with artillery mounting, I for one shall have no objection, but I have not very great hopes of it. On the other hand, I fully believe in the 6-or 8 pdr. shrapnel guns which I am making. Those guns, I believe, will and must go wherever light artillery goes, but heavy field artillery cannot move quickly enough, and cannot advance so close to an enemy as these quick-firing guns protected by their shields are able to do.

Major-General ARBUTHNOT: I have had a great deal to do with experimental guns, and all the machine guns in the service have passed through my hands. Perhaps, therefore, I may be allowed to say a few words. I am not going to touch so much upon the question of tactics as on that of equipment, but I think that there ought to be two separate equipments, one for cavalry and one for infantry. With regard to whether the gun should be attached to a regiment of infantry or cavalry, or whether it should form an independent unit, is I think a matter of minor importance, provided you have a separate equipment for the two arms with which it is to be used. The galloper carriage first introduced two years ago was got up on Lord Charles Beresford's suggestion, and has been worked out since by Colonel Liddell, Mr. Nordenfelt, and myself, and I believe the last carriages which have been issued have given general satisfaction to the 10th Hussars, which regiment has carried through all the experimental work. Although one of the regiments at Aldershot made three hits out of seven rounds, the 10th Hussars certainly made much better practice than that. I have seen them practising with the guns on the galloper carriages with the horses in the shafts, and they certainly made many more hits than three out of seven, or whatever it was. I think if the horses are trained and the men are trained and understand the working of the guns, with the aid of the prop which has been introduced by Mr. Nordenfelt, very steady firing can be obtained, even without taking the horses out.

THE CHAIRMAN: At what kind of target and at what range?

General ARBUTHNOT: At ranges below 600 yards and the horses left in; beyond 600 yards the horses may be taken out, and then the fire will be just as steady as on any other kind of carriage on which the gun might be mounted. There is one great advantage in the two-wheeled carriage for cavalry, namely, that it can be brought into action pretty quickly, whereas, if you have a limber, and you have to unlimber your gun before you go into action, you cannot fire half so rapidly as if you carried the ammunition with the gun itself. With regard to the infantry mounting, there are two equipments for infantry, one being

with mules, which is intended for mountainous countries. It is never intended that the mule equipment shall be for the ordinary service of the machine gun working with infantry, but just as you have two equipments for artillery, the mountain equipment and the general equipment, so with the machine gun. Therefore, to say it is useless is only to say it is useless if you are in a country where a superior carriage can move, but it will not be useless in a hilly country where you cannot use the ordinary carriage. The mule equipment of the machine gun is a very good one for the purpose for which it is intended, namely, for use in mountainous countries. With regard to the two-wheeled equipment of machine guns to be used in conjunction with infantry, the mounting is based on the same lines as the landing carriage for the navy. That landing carriage of the navy was got up after the campaign in the Soudan. The Naval Brigade there had a Gatling equipment converted to take the Gardner gun with a limber, but it was found so heavy and so inconvenient, and in every way so objectionable, that Captain Wilson, R. N., who had the working of these guns in the Soudan, wrote a report on the subject, in which report he advocated the adoption of a two-wheeled in preference to a limber carriage. A committee was formed, of which Captain Wilson was a member, and which recommended the two-wheeled landing carriage, which was subsequently adopted, and which I believe gives general satisfaction in the navy; it has entirely overcome the objection which was found with regard to the use of the limber carriage. When it was desired to get up an equipment for the infantry the naval landing carriage was taken as the line on which to build the infantry carriage, in consequence of its having proved so successful. I am speaking under the correction of Mr. Nordenfelt, but I believe the landing carriage which was used for the infantry as far as regards the mounting was on the same lines as the landing carriage for the navy.

Mr. NORDENFELT: Entirely.

General ARBUTHNOT: That carriage was two-wheeled; two horses can be put in it if necessary, a man riding on the near horse. That is considered preferable to having one horse and leading it. There is no objection to a man riding and driving the carriage. The gun can be fired with perfect steadiness. The horse can be either taken out, or the gun can be fired with perfect steadiness by propping up the shaft if the horse is left in. I have seen most excellent practice made with a gun mounted on a carriage of that sort, and considering that it can carry 2000 rounds of ammunition that gives it an immense advantage over the limber carriage, which should not be forgotten. With regard to the weight of the gun, I think no gun issued to infantry or cavalry should exceed 100 lbs. in weight at the very outside; anything beyond that to my mind necessitates a very much heavier carriage and wants more strength. A gun under that weight could be carried on a comparatively light carriage, because there is not the same wear and tear as with a heavier gun. Another advantage is that it carries very much more ammunition for the same weight. I do not agree with Captain James, that the small-bore cartridge is unsuitable for the machine guns. I think if a cartridge is efficient out of a rifle it is equally efficient out of a machine-gun, and to my mind the great advantage of the machine gun acting with cavalry and infantry is that it should fire the same ammunition as rifles, because then every reserve of ammunition would supply both machine guns and the rifles.

Captain JAMES: May I may be allowed to explain? I do not deny the use

of the new cartridge with a machine gun, but I believe you will get a very much better effect, quite worth all the additional complication of ammunition, out of my proposal.

General ARBUTHNOT : That is a point I should hardly touch on to-night. The question of the ammunition of machine guns is somewhat departing from the subject of this discussion. I think, however, being able to carry more ammunition is another advantage of having the light cartridge. If the gun is, say 90 lbs. in weight, you can carry 2500 rounds of ammunition without its being too much for one pair of horses, and you can have a carriage strong enough to carry that weight of ammunition with a light gun. I think the 10-barrelled Nordenfelt is altogether out of the question for field work. If you go into that great weight of gun, you may at once have field artillery, it is altogether beyond the question of musketry, it is too heavy a gun for field purposes. There is one point that has not been touched upon, and that is with regard to the use of machine guns. I think it will be found in warfare that they are more useful for defensive purposes than for offensive. For defending a bridge, or a defile, or for street firing, the machine gun will, I think, be invaluable. You can by its means fire a rain of bullets concentrated on one spot, down a narrow lane, which no number of men could ever attempt to compete with. I think myself, a large weight of guns of a few barrels each would be more efficient than one gun with several barrels, because the fire can be spread over a larger surface. You cannot kill a man more than once, and if you fire your 10-barrelled Nordenfelt, ten bullets may hit one man, which is not the service that is wanted. What is wanted is to spread the fire over as large a surface as possible with a few barrels. I will not detain you longer.

Lieutenant-Colonel J. P. BRABAZON, 10th Royal Hussars : Sir, I rise to make a few observations on this important subject, and do so with the greatest diffidence, as, unlike most of the speakers whom we have heard this afternoon, I have not had the advantage of reading or knowing the contents of the very able paper by Lieutenant Benson, until it was read to us by him a few minutes ago. When I entered this hall I had no intention (as I was utterly unprepared) of taking part in the discussion, but with your permission I should like to make a few remarks on what I have heard fall from the speakers who have preceded me. As to the description of machine gun, and its various scientific technicalities, I leave to cleverer men than myself to determine, but for cavalry it is absolutely necessary that it should be of a light and handy description. That attached to my regiment, and horsed with two horses, has in my opinion proved itself a very light, handy, and suitable weapon. But one detail I think common-sense points out to us to be absolutely necessary to its utility, and that is that it should be of the same calibre, and carry the same cartridge as used by our infantry. Lord Chelmsford, in his remarks, said that the great anxiety shown by both infantry and cavalry to have this machine gun attached to them was a reason, in his opinion, that neither should have it. I beg to differ most entirely with his lordship. English soldiers are very conservative and look with distrust on any change of armament and equipment, and the very fact that these two branches of the service are so anxious to get it is, in my opinion, a strong reason not that neither should have it, but that both should. When I mentioned two arms of the service I ought to have included the third, for artillerymen seem as anxious to have it as an adjunct, as do the infantry and cavalry. I have heard during this discussion the machine gun frequently al-

luded to as a "gun" and talked of as being in "battery." I protest against this. It is not a gun in the popular military acceptation of the term. It is a "rifle," *pur et simple*, a machine rifle, and a rifle that in my opinion ought to be permanently attached to every cavalry regiment, whatever its best position may be for the other branches. Mr. Benson I believe favors, and Lord Chelmsford supported the idea, that these machine-rifles should always be attached to the artillery, and in action some of them placed under the immediate command of brigadiers and generals of divisions to be sent for when wanted; this would in my opinion never answer, especially as far as cavalry is concerned. It is essentially a weapon of "opportunity," to be used on the spur of the moment, and if that chance is allowed to slip by, the whole *raison d'être* of the gun disappears. Napoleon, when he advanced on the Danube in 1805, had his cavalry from 80 to 100 miles ahead of his main body. In the Franco-Prussian War, the German cavalry, whenever possible, was from 20 to 30 miles ahead of the infantry. The rôle of cavalry is to be as far as possible in advance, and act as a screen to the main body. Imagine cavalry not 80 or 100 miles, nor even 20 or 30 miles ahead, but say only 4 or 5 miles ahead, and suddenly finding a splendid opportunity for using these guns, and having to send back miles to get them, it is a thousand to one the opportunity when they might have been of the utmost utility would have fled long before they could come up. I am surprised, from an extract read out of a letter from Colonel Ward Bennitt, to find so distinguished a cavalry soldier an opponent to having this weapon attached to his regiment. I cannot conceive a cavalry soldier not receiving it with open arms, for I foresee that their introduction as part of cavalry armament will be of immense service, and tend to keep the cavalry soldier where a cavalry soldier ought to be, viz., in his saddle. Englishmen understand the horse better than any other European nation, I think I may say better than any other nation in the world. We breed the best horses, our men ride better, are better dressed, and better equipped. We have everything in our favor to make our cavalry, if small in number, the most splendid body of horsemen in the world, and we throw all these advantages to the winds and worry ourselves with trying to turn what ought to be, and could be, the most magnificent cavalry into indifferent infantry; just as on the same principle we are turning our best infantry into execrable cavalry under the name of "mounted infantry." It is lamentable to me to see the rôle of cavalry so completely misunderstood, and I know nothing more ridiculous and heartbreaking than the sight of a dismounted dragoon, encumbered with sword, sabretasche, and spurs, carbine in hand, dodging about bushes like a rabbit. I foresee that these guns may possibly save us from all this, and once more put our splendid cavalry in its proper place. But then some people are very narrow-minded about changes of any sort, and I am afraid lancers are ultra-conservative about their armament, for I remember there was just as strenuous an opposition on their part to the introduction of carbines as there now appears to be to the machine guns. I remember, at the time I allude to, an officer of lancers who was about to exchange into a hussar regiment telling me that his old troop sergeant-major asked him if the report he heard of his intended exchange was true; on being told it was, said sadly: "Well, sir, of course you know best, but personally I shouldn't like to be found drowned in the same parish with a carbine regiment." Evidently he feared that his friends might think he had passed his last hours on this earth in the disreputable company of anyone who could use a carbine as a weapon of offense or de-

fense, and apparently the old conservative sergeant-major is not singular, and there are some of the opinion that any regiment who can advance the utility of the machine gun must be utterly disreputable as the carbine regiment referred to by the old lancer. Referring to the Germans, the most practical and scientific soldiers of the day, and their estimate of the machine gun, I may remind you that they were opposed in 1870 and 1871 to an enemy that had machine guns (*mitrailleuses*) attached to their infantry, but they apparently did so little damage and were so little thought of by the Germans, that though seventeen years elapsed since that war, I have never heard of their adopting machine guns as adjuncts to their infantry battalions or artillery batteries. Last summer, however, Prince William of Prussia, accompanied by some of the most distinguished cavalry officers of the German army, who were over here for the Jubilee rejoicing, did my regiment the honor of paying us a visit at Hounslow, and were so impressed with our two-horse Nordenfolt gun, its handiness and applicability to cavalry movements, and the ease with which it kept up and manoeuvred with us during a galloping field-day, that Prince William immediately ordered a fac-simile gun to be sent over to Germany, and we sent over one of our men to Potsdam to show them how to work it; and so taken by it are they that I believe I am right in saying that it is going to be adopted for their cavalry. Lord Charles Beresford is anxious for me to repeat what I told him a few minutes ago as to the confidence it inspired and the popularity of this gun among the men of my regiment. I was much surprised to hear from one of the gentlemen who preceded me that he found the consensus of opinion among cavalry officers at Aldershot to be adverse to this gun, and that it was unpopular with soldiers; all I can say is that such is not the case in my regiment, where the gun is very popular, as I confidently believe it will in time become with the remainder of our army. Great stress has been laid by those whom I may call the opponents of the gun on the danger of its being put out of action through horses being shot, or from being upset going over rough ground. There seems to be much misapprehension about the way these guns are to be used. On only the rarest occasions have I seen them fired with horses attached, and then never against infantry. But there may arise occasions when you want to get a few rounds in against cavalry advancing in close formation, when it would be necessary to use them with the horses attached, so that they may continue firing till the very last second and then gallop away out of action or under cover of their own cavalry. As regards the horses being shot, that is of course an accident that equally obtains with artillery, and a gun with its lead horses shot is equally out of action until they are replaced by others. In every troop there are five or six horses trained to harness, and if one or even both horses were shot they could be easily and speedily replaced. As regards their upsetting, they can go anywhere where cavalry can go. I have seen our gun worked over the Fox Hills (which I think everyone will allow is bad ground for cavalry; at all events, I have never seen a field-day without both men and horses going head over heels, through galloping into the heather-hidden holes and ruts), and yet the gun working at a gallop has never come to grief. But suppose it did. Suppose all the horses trained to harness were shot. Suppose the gun went head over heels, and was so damaged as to become useless. It would be bad luck, but not an irretrievable disaster. Knock out a linchpin and leave it, say I. One thing I would not do. I would not sacrifice a single life to save it, out of pure sentiment. Neither would I sacrifice a single life to

save any gun, out of pure sentiment. I have often, at Aldershot, had our gun attached to my squadron; have often asked for it, if sent out to watch or oppose a superior force, feeling the great advantage which its presence must give me, and have never yet seen a field-day when I should not have had an opportunity of using it with extraordinary effect. In conclusion, I may say that it is my firm conviction that a cavalry regiment armed with these guns as they should be, viz., four guns, one to each squadron, would be more than a match for any two regiments not similarly armed.

Captain R. S. BADEN-POWELL, 13th Hussars: After what Colonel Brabazon has said, there is not much left for me to add. In selecting our tools for any kind of work, we usually look to the particular sort of work we are going to do, and if we want to use a sledge-hammer or a tin-tack driver, we do not go and select a farrier's hammer that will do the work of both—equally badly. Lieutenant Benson has selected a very nice kind of machine gun for general purposes, but I do not think he has fully considered the very different nature of the work that the various arms have to carry out. I do not think, for instance, that he has noticed the great difference between cavalry work and that of the other arms. To my mind there is as much difference between the action of cavalry and that of other arms as there is between an Englishman's way of fighting and a Frenchman's. The infantry and artillery fight the good old English way; they square up to each other and have it out hammer and tongs, but cavalry fight more in the manner of the Frenchman, who comes up to you, looks you straight in the face, clenches his teeth, and then suddenly lets you have a kick on the shins before you expect it. The success of cavalry fighting lies in sudden attacks from a most unexpected quarter, and for this kind of fighting I think the present cavalry machine gun is the most efficient weapon that could be devised. It comes up almost unseen by the enemy, especially if it has an escort of six or eight men, who can mask it completely until they arrive within close range. With scarcely a pause, it can commence firing, pour in a rapid, deadly fire, and go on until the last moment with safety, and then bolt away for its life, if it likes. All the effect of this sudden and rapid action would be lost in the case of a gun that had to move with a limber and four horses attracting attention, and which, when it came up, had to unlimber before it could commence firing, and then to limber up again in good time to get away if the enemy came after it. I think the infantry ought to have a gun of altogether another kind from that of cavalry. They ought to have tools adapted for their special work. Let cavalry have a cavalry galloping gun, and let infantry have an infantry gun, and, if necessary, have a general utility gun for the artillery if you like; but do not have one to act for all. The lecturer says that "with cavalry the machine gun has nothing in common, except perhaps its power of rapid movement, for cavalry are supposed to act by shock, while machine guns act by fire alone." Cavalry do not always act by shock. I suppose throughout the Franco-Prussian campaign any regiment you like to take hardly acted by shock more than half a dozen times in the whole campaign; whereas pretty nearly every day they would be engaged in holding and seizing defiles, in occupying advanced posts, on outpost duty, in harassing the enemy's flank, in attacking convoys, in holding defiles when on the rear guard in retreat. This is the usual sort of work which cavalry have to carry out on service, and for it the cavalry machine gun would be the most powerful aid that could be devised.

Captain PALLISER: There is one part of the subject on which I wish to say

a word, as it has only just been touched upon. That is, the wonderful shooting of the Maxim machine gun. My opinion is, and it is a coming question, that this machine gun gives the best shooting known, shooting that cannot be beaten even by picked marksmen in bodies. There has been some remarkable shooting going on lately, which is new to this meeting, and about which I must be reticent to some extent, because it is under government supervision, and is carried out before the committee. This shooting has been made not only at fixed marks, but in traversing from one mark to another at ranges of from 600 to 975 yards. In one case an officer who had never fired the gun before in 75 rounds made 72 hits at 600 yards. I say that the admirable shooting of the machine gun is the coming question, and I do not agree with Mr. Nordenfelt in the great merit of scattering fire. These weapons, when used in large numbers, whether made by Mr. Nordenfelt or Mr. Maxim, or other machine-gun makers, must be brought to this perfection; and then the conditions of war will be changed, because by their use ordinary soldiers will be able to shoot as well and better, and in far greater volume, than even picked marksmen in numbers.

LORD CHARLES BERESFORD: It seems perhaps rather impertinent for a sailor to rise to speak on a subject so entirely connected with the sister service, and particularly in the presence of so many distinguished artillerymen; but I have always taken such very keen interest in this question that I hope I may say a few words. There is one expression that I think ought to be altered in discussing this question, and it is one which has evoked a certain amount of discussion to-night, namely, the name that it is given to these weapons. I think they ought to be called "machine rifles," because, directly you get into the question of "machine guns," you have a discussion as to how they are to be mounted. On two occasions, at Alexandria, if I had had a machine rifle that could have galloped, I could have sent a certain amount of help, and it struck me whether it might not be possible to mount the machine-rifles so that a horse or horses could gallop with them. Directly the question of "guns" and "batteries" is produced, the limber and trail is discussed, but keep this machine as a "rifle," and it might be able to be put into action at a moment's notice. That is what passed through Captain Wilson, V. C.'s brain in the Soudan, because the time he lost in having to "unlimber" and "Action right," "Action front," or "Action rear," the amount of time he so lost probably lost him a good many men, and prevented his being able to fight his gun at all. The object of the two wheels, either with infantry or cavalry, is to have the gun always in action. It should be able to train over its own wheels, and the mere dropping of the trail or the word "Halt," "Right" or "Left reverse," should put the gun immediately in action. I think it would be a very wise thing if the authorities would get rid of the expression "machine gun," and as soon as possible use "machine rifle"; for really, after all, this weapon is simply a cluster of long-range rifles. I must congratulate the lecturer on one of his suggestions, to the effect that something more practical should be done with this. It is very gratifying to us who have agitated for this arm for so many years to find an artillery officer working out a paper of this description, coming as it does from his branch of the service, which we have generally thought has been opposed to the machine gun, principally, I believe, because it has been called a gun. I say it is very gratifying to find an artillery officer who has brought the question so prominently before the public. The practical suggestion is, either that the obsolete 9-pounder batteries should be formed into machine-rifle batteries, or something

of that character should be done, or that a committee should be appointed in order to thresh this question actually out, because at present there are so many different opinions on the matter; although I think generally the officers in the sister service acknowledge that machine guns have a very useful part to play in future wars. Of one thing I am perfectly certain, that directly we produce smokeless powder, they will have a most important part to play. I think the suggestion is very wise, that this weapon should not supersede any arm of the service. Why should it? It is a new arm; it has capabilities that other arms have not got. As far as rifle firing goes—as a cluster of rifles—it should no more supersede any arm in the service than should our torpedo boats or our submarine boats supersede ironclads or cruisers. It is something else that has got to be counted on when you go into action, and as far as you can utilize it to knock your enemies into a cocked hat the better for you, but take care that they do not utilize it against you. You must be prepared to meet like with like, which is so important in all warfare. It would be a very serious thing if the German or any other army were to take up the machine-gun question, and we, with all our practical experience, having found it so useful on so many occasions, were not to take it up and thresh it out as has been proposed. There is one thing more, in my humble opinion, and I hope I shall not be considered presumptuous in giving my opinion as a sailor; but I have commanded these guns on shore as well as afloat, and I think one of the principal points to realize about the machine gun is, that it should be a unit. If you put it into batteries, if you put it into troops or into any section, or where the guns have got to work together under an officer as a battery or similar formation, you would make a mistake. They should be essentially skirmishing clusters of rifles, and with each gun should be its own officer. If you like to call them a "battery" or "troops," for marching in peace-time, do so, but the moment they are put into action they should work in separate units; one man might go to a clump of trees or a bridge and hold them, and another man to another place, an officer with each unit, and do something equally good; but directly you put them into a "battery" you will have a battery firing against them possibly. What is the result? You get hit on the flank and you are knocked out of action, as the French mitrailleuses were by the Prussians in 1870. The Germans had a holy horror of the mitrailleuses instilled into them, and what did they tell their artillery to do? They said: "Never mind what else you do, but as long as you see the mitrailleuse battery, devote all your attention to it"; and as these mitrailleuses all drew up in line and were worked as batteries, they were generally taken on the flank, and two or three shells put them out of action. I think the lecturer has given a most useful and instructive lecture, and I sincerely hope much good may come of it, and the machine rifle introduced into the service, as a new arm, to be utilized as the general commanding a brigade may think fit.

THE CHAIRMAN: I am very glad of the opportunity of following Lord Charles Beresford. I think he needs no apology whatever for addressing us on this subject, because we know the connection which he has had with machine guns all along. The suggestion that he has made as to the change of term and the use of the guns in very small units are, I think, most valuable. I should like to make a remark upon my own appearance here, as an officer of artillery, in the chair. Seeing that the lecturer also belongs to that branch of the service, it might appear as if the artillery had something specially to do with the machine gun. But, in point of fact, except that the artillery administration—

that is to say, the Director of Artillery—has to do with the bringing out of the gun, the artillery arm has nothing further to do with what are called machine guns; neither have they any jealousy whatever with regard to them, as Lord Charles Beresford seemed to suggest just now. I think they have no jealousy whatever as against them; on the contrary, at one time I think they rather claimed, or were anxious to have more to do with them—to have more share in their management than has been subsequently accorded to them. I confess, at first my own feeling was that the artillery could very conveniently take them over; but I have come away from that way of thinking. I do not think there was sufficient ground for it. The weapon is an entirely different one from the artillery weapon proper; its aims and its powers are entirely different. I think the observations that have been made show that the action of the military authorities in putting these weapons in charge of the infantry and in charge of cavalry regiments has done an enormous deal to popularize the weapon; and I cannot conceive that in any other way could officers, non-commissioned officers, and men have had the opportunity of making such intimate acquaintance with the weapon, than by making it for the time being an integral portion of their regiments at Aldershot. I do not think it necessarily follows that we should look to that as the end of all things as regards the organization of such weapons. I think in a campaign it must remain a rule that an infantry regiment or battalion, or a cavalry regiment, will not always require to have a machine gun with it. It might go over ground where such a gun could be absolutely of very little use, and therefore, I think, a general would wish to be able to attach a machine gun to an infantry regiment or to any body of troops for a time. In order to enable him to do this, he should have a train of machine guns, each gun as a single unit, and ready to go by itself, to be detached for any number of days to any point where its services were required. As regards the officering, it should be officered much in the same way as the mounted infantry are officered. So far as the infantry branch is concerned, it should be officered and manned in the same way as mounted infantry; that is to say, by men taken from the infantry. Similarly, you would require a body of machine guns equipped to accompany cavalry, and that might be officered and manned by men taken specially from the cavalry, ready to be attached to any regiment which required its services, and in that way we should be able to get the greatest value out of the arm. In the meantime I think we have every reason to congratulate ourselves on the direction which has been given to affairs, and be assured that we are in a very good way, and in advance of most other countries.

Lieutenant BENSON: There appears to be considerable difference of opinion among cavalry officers about these galloping carriages, as to whether they are to be attached to cavalry regiments or not. Cavalry officers present, I think, are in favor of attaching them to cavalry permanently. With regard to the two-wheeled carriage, there is a good deal of opinion here in favor of it, as well as against it. Its readiness in coming into action is certainly in its favor; but some gentlemen have said that the horses are intended to be unhooked, because if they are not unhooked the firing will become bad over 600 yards. If they are to be unhooked at all they might as well have the limber, because they can come into action very much more quickly with a limber and trail hooking on the limber than by unhooking the horses. [Captain BADEN-POWELL: They can unhook it in about ten seconds.] I think the unlimbering can be done in

two seconds. The horse artillery sometimes manage to get a round of blank off within about five seconds from the word "Halt," if they are asked to do so. There was another objection made to having the guns in "batteries" or "troops," as I call them. I think, if for no other reason, they must be formed into troops for administrative purposes alone. I have said in my lecture it is easy enough to get forces to act separately which have been trained to act together, but it is a very different matter to get those to act together which have only been taught to act separately. Several gentlemen here think they ought to act together, and others separately. Probably the truth lies between the two; sometimes they will have to act together, and at other times separately; therefore have them in troops by all means, but have them able to act separately, if necessary. Major Smith, I think, got wrong about the weight of his carriage. He proposed that the carriage should be drawn by two horses, and said the weight was 17 cwt. The most a horse can draw at speed is about 6 cwt.; two horses would therefore draw about 12 cwt. The carriage that I propose weighs 25 cwt., and therefore can be drawn by four horses. In horse artillery the weight of the carriage complete is 36 cwt., which is actually 6 cwt. per horse. General Arbuthnot said the ammunition was separated from the gun when the gun was unlimbered. I do not see that that holds. The limber is 10 yards in rear of the gun, or nearer if desirable, and there is also a considerable amount of ammunition, about 1000 rounds, in the axletree boxes. The total amount of ammunition carried in the galloping carriage is 1546 rounds. Against that you have, in the carriage I propose, nearly 5000 rounds in the limber and 800 in the axletree boxes, and you have your 10-barrelled gun, which is very much more powerful. General Arbuthnot also says that with the 10-barrelled gun ten bullets will hit one man. If the man chose to stand a yard off in front probably they would; but at all ordinary ranges the bullets would scatter themselves, and not go within two feet of each other. Mr. Nordenfelt will tell us how much ten bullets will scatter at 500 yards.

Mr. NORDENFELT: About six feet the 10-barrel; the smaller gun scatters more.

Lieutenant BENSON: I tried the 3-barrelled gun the other day, and found that at 30 yards' range it scattered over 5 feet during a few seconds of rapid fire from the light carriage.

Mr. NORDENFELT: The smaller guns scatter the most.

Lieutenant BENSON: At any rate, the ten bullets cannot hit one man. They might hit ten men, perhaps, standing up together.

General ARBUTHNOT: Ten barrels fired ten times would hit ten men ten times.

Lieutenant BENSON: They would probably hit the men in the rear after those in front had been killed. I think that is all I have to say.

(November 18, 1887.)

* Mr. Nordenfelt has since corrected this statement as follows: "When the scattering gear is not used the 10-barrelled gun spreads over 10 feet at 500 yards, and 20 feet at 1000 yards. With scattering gear the spread can be adjusted up to a maximum of 100 feet at 1000 yards' range.—G. B.

A NEW BALLOON MATERIAL.

BY GUSTAVE HERMITE.

Translation from *L' Aerophile*,*

By MAJOR ROBERT CRAIG, SIGNAL CORPS, U. S. Army.

THANKS to the patient and learned researches of my fellow laborer, Mr. Besanson, we have been able to obtain a silk texture of marvelous lightness and strength, in view of which we have not hesitated to abandon goldbeaters' skin which formed the envelope of our former balloons. In order to afford an idea of the qualities of this material, it will suffice to say that its resistance to traction is 550 kilograms (1212.7 lbs.) per lineal metre (3.28 ft.) and that its weight per square metre (10.76 sq. ft.) is from 30 grams (463 grains) to 100 grams (1543 grains), weight of seams not included. Four coats of balloon varnish make this envelope completely impervious.

For the construction of the new balloon Mr. Besanson has adopted the method of panels, which on account of the many advantages it offers is applied to all balloons of the central balloon establishment, and which makes them resemble a curious work of marquetry. The material, carefully cut out from a geometric working drawing, is put together and basted by hand, then sewed by machine so as to form the whole of the sphere, composed of 504 panels. Some elegant collars (reinforcements of material) have been adapted around the orifices of the balloon, which, before varnishing, only weigh 9 kilograms (19.84 lbs.) 130 grams (2006 grains). Done up in a small package, which a child could easily carry by hand, it might be said to resemble a pretty ball-dress rather than an aerostat 9 metres (29.5 ft.) in diameter, capable, when inflated with hydrogen, of carrying four persons in the air or raising to a height of more than 20 kilometres (12.43 miles) a collection of scientific apparatus. More than one feminine eye, charmed by the brilliant whiteness of the material, has witnessed with despair the fatal moment of varnishing, a barbarous though necessary act, which causes this masterpiece of weaving and sewing to disappear under linseed oil. The varnishing is an operation which must be done with skill and quickness on account of the heating produced by the oxidation of the oil in contact with air. Thanks to the precaution taken with the work, this labor can be done without accident. The envelope weighs 31 kilograms (68.35 lbs.) after the drying of the fourth coating of varnish and is then deemed sufficiently impervious to endure the ordeal of an ascension.

The surface of a balloon of 380 cub. m. (13,648 cub. ft.) capacity being 254 sq. m. (2733.8 sq. ft.), it follows that the weight of this aerostatic envelope completely finished is only 122 grams (1883 grains) per sq. m.

*January and February, 1897.

(10.76 sq. ft.). Now the weight per square metre (10.76 sq. ft.) of a pongee or cotton balloon withstanding 1000 kilograms (2205 lbs.) per metre varies from 330 to 400 grams (5092.6 to 6172.8 grains). It is seen then what lightness can be realized in the construction of this aerophile without sacrificing solidity. A simple calculation based upon preceding explorations proves that this envelope, if it were inflated with pure hydrogen, would ascend to a height of almost 24 kilometres (14.9 miles), even admitting that the barometric formula of Laplace is to be applied to regions of our atmosphere where the pressure is reduced some centimetres of mercury.

The upper orifice of the aerostat has a diameter of 0.48 metre (1.57 ft.). It is provided with a light wooden ring divided into two parts and which is fitted there in a very strong way by means of bolted screw-nuts. This wooden ring, which is used as in ordinary aerostats for fastening the crown of the netting, carries a pulley through which a small cord passes which hangs in the interior of the balloon and by means of which apparatus can be hung at the centre of the gaseous sphere. A disk of varnished material held fast in the ring, prevents escape of the gas, and it suffices to tear it by pulling a cord directly attached, to cause very quick deflation of the balloon at the time of landing. This tearing cord can be made to act automatically by attaching to its lower end a light bamboo stick horizontally arranged which, catching the smallest object, produces the effect of an anchor. This arrangement, conceived by Mr. Besanson, has given the most happy results in our recent experiments.

The lower orifice of the aerostat, which has the same dimensions as the upper, is also provided with a light ring to which an appendage-sleeve is adapted. This consists of a funnel of varnished fabric 0.48 m. (1.57 ft.) diameter, and 2 m. (6.56 ft.) long, to the lower end of which a whalebone, bent in the form of an arc, is adapted which naturally tends to close this sleeve and acts as a valve to produce a fixed interior pressure rendered necessary in order to prevent the compression of the upper part of the aerostat in consequence of the air pressure during the ascending stage.

The netting, of white Anjou hemp of extraordinary quality, has 64 meshes and weighs 5 kil. and 200 gr. (11 lbs. and 3086.4 grains). Its total resistance, which is 5500 kil. (12,126.7 lbs.) at the top, reaches 8300 kil. (18,300.3 lbs.) at the equator, and diminishes thence to the suspension cords, numbering 8 which have a total resistance of 4520 kil. (9965.9 lbs.). This arrangement, which appears odd at first sight, is perfectly justified by the fact that, during inflation, the maximum number of sacks of ballast to be suspended from the net is found at the equator. It is then at this point that the maximum strength ought to be found on account of the considerable wear produced by the sacks of ballast.

The suspension cords are attached to the net by a system of rolling goose-feet with box-wood thimbles. They meet in one point at their ex-

tremity by means of a special arrangement called a cone. It is at this point of meeting that are found fastened, first a thimble in which the manœuvring cable may run, then two cords, one light at whose extremity the apparatus are suspended, and the other stout which is hooked to a plate loaded with sacks of ballast when the balloon is hoisted to the desired height by the manœuvring cord. Should it be desired to set the balloon free, the manœuvring cord is pulled, and when it has fallen to the ground, it will suffice to cut the retaining cord with a knife. By this procedure any shock to the instruments at the moment of departure is avoided, because the retaining cord acts upon the balloon and not upon the instrument.

The balloon material only weighs 40.496 grams (624.0 grains.)

RELATIVE EFFICIENCY OF INFANTRY AND ARTILLERY FIRE—GERMAN OPINIONS AS TO THEIR THEORETICAL VALUE.

(Translated from the *Revue d'Artillerie*.)

BY LIEUT. W. C. RAFFERTY, 1ST U. S. ARTILLERY.

(Continued from JOURNAL No. 90.—Conclusion.)

EFFECTS OF ARTILLERY FIRE.

HITHERTO we have considered only infantry fire, but in a similar manner we may study that of artillery; the same method is applicable to both arms with certain restrictions of which we may take account in our calculations.

STUDY OF THE CONE OF DISPERSION.

All study of the efficiency of artillery fire must necessarily begin by an examination of the properties of shrapnel, which is the normal projectile of artillery in the field. Now, when we are studying the properties of shrapnel, we habitually start from two hypotheses: first, assume that the trajectories of the bullets are rectilinear, at least in that portion of their trajectory where they are murderous, then that the sheaf has the form of a right cone with a circular base in the interior of which the bullets are uniformly distributed. These two hypotheses are sufficiently exact for practice and we can do no better than admit them.

Killing Power of the Bullets.—We know that in the cone of the shrapnel, it is not the total length which must be considered, but only the length of the useful portion, that is to say, the portion in which the bullets have a killing effect. Here we meet our first difficulty. The force of penetration of a bullet depends on its mass and its velocity, and as the velocity diminishes with the distance of the bullet from the bursting point, there comes a moment when the bullet no longer has a force of penetration sufficient to be effective against men and horses.

We must therefore find what living force a bullet must possess in order to be deadly. Opinions differ very much on this point, and it is for this reason that the weight of bullets of shrapnel are different in different countries. We will not recount here the divers theories which have been advanced on this subject and we will adhere to that one given by Commandant Journée in the Memorial on Powders and Saltpetres.

This officer has carried on at the Châlons Camp with the French small-arm, experiments from which he has formulated the following laws :

Let P be the weight of an animate being, man, horse, or mule, on which one fires ; F the living force of the bullet on impact ; S the right section of this bullet. In order that the bullet may pierce the skin and penetrate some centimetres into the soft parts, it is necessary that

$$\frac{F}{S} = \frac{P}{25}$$

A wound made under these conditions will hardly ever put a horse *hors de combat*. A man dressed and equipped will seldom be seriously wounded.

To injure the bones and sometimes to crack them, it is necessary that

$$F = \frac{P}{10}$$

The wounds in this category may be considered as deadly, but it is here that estimations vary. Starting with this formula, we can calculate the velocity on impact (the striking velocity) necessary for bullets of different weight to produce serious wounds.

STRIKING VELOCITIES NECESSARY FOR BULLETS WEIGHING 11, 13 OR 15
GRAMMES TO PRODUCE SERIOUS WOUNDS.

Weight of the bullet gr.	11	13	15
Against men.			
Striking velocity. m.	120	112	104
Against horses.			
Striking velocity. m.	264	246	228

From this can be calculated the extent of the serious zones for each kind of bullet.

EXTENT OF THE SERIOUS ZONE.

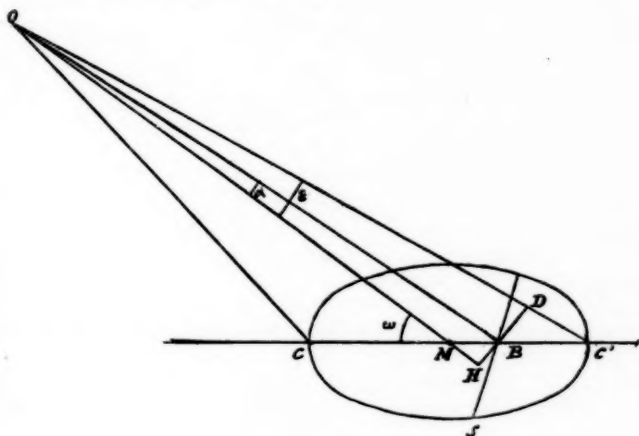
Velocity at Bursting Point.	Weight of the Bullet in Grammes.		
	11	13	15
m.			
FIRE AGAINST MEN.			
400	392	457	520
350	368	433	500
300	336	400	466
250	290	350	416
200	224	280	340
150	112	160	217

Velocity at Bursting Point.	Weight of the Bullet in Grammes.		
	11	13	15
m.			
FIRE AGAINST HORSES.			
400	87	110	143
350	62	85	115
300	30	52	80
250	30	4	39

The remaining velocity never falls below 200 m. for present guns, and therefore the bullet of 11 gr. will assure a serious zone of at least 200 metres at all ranges against men, but against horses only the bullet of 15 gr. is strictly sufficient. If we wish to diminish the weight of the bullet, we must increase its velocity at the moment of burst and adopt for this purpose a shell arranged differently from our common shell.

We will not digress further on this point, which goes a little beyond our subject and which we have touched on only to give an approximate idea of the zone of action of shrapnel.

Effects of Shrapnel fired singly.—Having admitted these preliminaries we will find now the mathematical expression for the efficiency of burst in case of a shrapnel fired singly.



Let O be the point of burst of a shell (Fig. 1); O M its trajectory; W the angle of fall; E half the angle of the cone, limited in the plane of fire by O C and O C'; B the position of the target of indefinite length, of height h , and composed of continuous files of total length l ; BS half

the length of the serious zone seen in perspective. The surface of the target exposed to the bullets is $2 BS \cdot h$ (the surface of the target being supposed normal to the trajectory).

On the other hand, the real surface on which the N balls of the shell may be distributed is equal to πHD^2 , HD being perpendicular to OM , and passing through the point B .

The number N of bullets reaching the target will be given by the formula $\frac{n}{N} = \frac{2 BS \cdot h}{\pi HD^2}$

But the number F of files contained in $2 BS$ is equal to

$$F = \frac{2 BS}{I}$$

If n is smaller than F , there are about n files touched. If on the contrary n is larger than F , there will be F files touched, since we admit that a single touch is sufficient to put one file *hors de combat*.

The efficiency will be represented by the smaller of the two numbers n and F . We have there evidently a maximum, because in reality the bullets are not equally distributed in the interior of the cone; we may very reasonably admit, however, that the real efficiency will be sensibly proportional from shot to shot and from shell to shell to the maximum efficiency.

That settled, let us calculate N and F as a function of the interval of bursting, $OB = I$ and of the angle $BO M = a$

$$BS^2 = HD^2 - HB^2$$

We have $HD = I \tan \epsilon \cos a$, $HB = I \sin a$

Consequently as $\cos^2 a$ and $\cos^2 \epsilon$ may be considered as equal to 1

$$BS = \frac{I}{\cos \epsilon} \sqrt{\sin^2 \epsilon - \sin^2 a}$$

$$\text{We have then for } n, n = \frac{2 Nh}{\pi} \frac{\sqrt{\sin^2 \epsilon - \sin^2 a}}{I \tan^2 \epsilon \cos \epsilon \cos^2 a}$$

$$\text{For simplicity place } K = \frac{1}{\tan \epsilon} \frac{\sqrt{NS}}{\pi}$$

S being the surface hl of one file, we can then write the value of n and F as follows :

$$n = \frac{2 \sqrt{\sin^2 \epsilon - \sin^2 a}}{I \cos \epsilon} \cdot \frac{K^2}{I \cos^2 a} \quad (1)$$

$$F = \frac{2 \sqrt{\sin^2 \epsilon - \sin^2 a}}{I \cos \epsilon} \cdot I \quad (2)$$

The smaller of these two quantities will express the efficiency of the shrapnel under the conditions assumed. The ratio of these two quantities is

$$\frac{n}{F} = \frac{K^2}{I^2 \cos^2 a}$$

If $I \cos a < K$, the efficiency will be expressed by F ; if on the contrary $I \cos a > K$, it will be expressed by small n . The efficiency will be a maximum when

$$I \cos a = K$$

and we will then have

$$n = F$$

These formulas permit a very simple graphical representation of the efficiency.

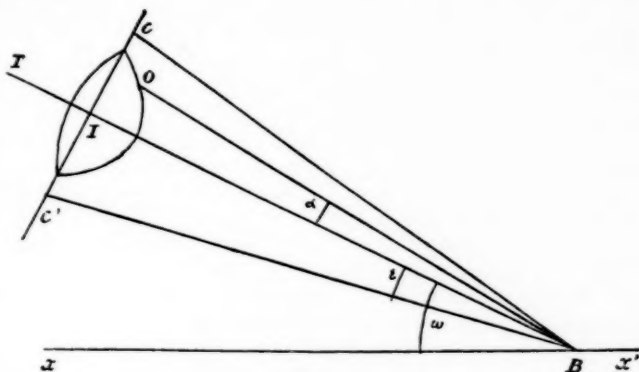


Fig. 2.

Thus let B be the target (Fig. 2); xx' the ground; BT the trajectory passing through the target and making with the ground an angle equal to ϵ ; BC and BC' two straight lines, making the trajectory an angle equal to ϵ .

Take $BI = K$ and draw CC' perpendicular to BT at the point I . This perpendicular is the locus of such points as fill the condition $I \cos a = K$. Consequently the efficiency of the shot bursting on the right of CC' will be equal to F and that of a shot bursting on the left will be n .

The locus of point having the same efficiency is accordingly easy to construct. It is sufficient to give to n and to F any value whatever (same for both), and to construct the curves representing by the expressions (1) and (2) above, in which the variables will be I and a . On the right of CC' , the locus is represented by a hyperbola having as asymptotes BC and BC' , and on the left by a curve which is easily deduced from the hyperbola. The bursting interval which corresponds to the maximum efficiency, as we have seen, is equal to BI , and therefore

$$K = \frac{I}{\tan \epsilon} \sqrt{\frac{NS}{\pi}}$$

For projectiles bursting at I , the angle is zero and the efficiency is equal to

$$\frac{2}{l} \sqrt{\frac{NS}{\pi}}$$

The interval of maximum efficiency, as well as that efficiency itself, is proportional to the square root of the number of bullets and to the square root of the vulnerable surface of one file S.

If we apply these results to the common shell of 90 and to the objectives which we have considered hitherto, we will find the following results :

TABLE XIV.

Interval of maximum efficiency of the common shell of 90 against lines of skirmishers or of cavalry of a density of 1 man to the metre, and against a battery in position.

RANGES.	Angle of Dispersion.	INTERVAL OF MAXIMUM EFFICIENCY (METRES).				
		Skirmishers standing.	Skirmishers kneeling.	Skirmishers lying down.	Cavalry.	Artillery.
M.						
500	13°	54	44	31	83	48
1000	15°	47	38	27	72	42
1500	16°	44	36	25	67	39
2000	16° 40'	42	35	24	65	38
2500	17° 20'	41	33	23	62	37
3000	18°	39	32	23	60	35
3500	18° 40'	38	31	22	58	34
4000	19° 20'	36	30	21	56	33
4500	20°	35	29	20	54	32

As the maximum number of files touched, this will be given by the formula

$$M = 2 \sqrt{\frac{NS}{\pi}}$$

whence are deduced the numbers following.

MAXIMUM OF FILES TOUCHED.

Line of skirmishers standing.	12.4
“ “ kneeling	10.1
“ “ lying down.	7.1
“ “ cavalry	19.0
“ “ artillery.	8.7

Efficiency of bursting fire in the case of several shrapnels fired at the same elevation.

The preceding results apply only to a single projectile; let us see now what happens in the fire of several projectiles at the same elevation. The errors which influence the position of the bursting points and consequently the efficiency of each shot, are :

1. Errors in combustion of the fuse.
2. Errors in range.
3. Errors in pointing.

We will first take the two former.

Errors in Combustion of the Fuse and Errors in Range.—The fact alone that the fuses do not act uniformly diminishes sensibly the efficiency of a series of shots.

If we admit for a moment that the firing is perfect in range, that is to say, that all the shells have the same trajectory, and that the elevations correspond exactly to the distance of the targets, the trajectory will always pass through the target, but the bursting points will be distributed along this trajectory, according to the law of probability, about a mean point, which will depend upon the fuse-setting.

During a prolonged fire, the number of shots which burst at each point of the trajectory is proportional to the ordinate of the probability curve. By multiplying the efficiency of each shot calculated as we have just said in terms of the bursting interval, by the ordinate of the curve of probability and by taking the sum of these products, we have the probable efficiency of any shot whatever. This probable efficiency is only the mean of the efficiencies of a large number of shots and the number which represents it is evidently that which measures the efficiency of the projectile fired under the assumed conditions.

To make these calculations, we must first know the probable error along the trajectory, which depends at once upon the probable error of bursting of the fuse and the error of the piece itself. Now, we may admit that the error of the fuse varies between 15 m. at 1000 and 30 m. at 4000 m. If we combine this error with that of the piece according to the law of squares, we obtain the resulting error, which may be considered as the practical error. This error is very nearly as follows :

20 m.	at a distance of	1000 m.
25	"	2000
30	"	3000
35	"	4000

Continuing we may very well for the sake of simplicity admit as we have just done that all the projectiles burst on the mean trajectory. This simplification is the more permissible since the projectiles depart very little in reality from the mean trajectory, and since their efficiency depends principally upon the bursting interval.

By varying the centre of the group, a position would be found for which the efficiency is a maximum, but it would be of no great interest to know this position for such purely theoretical knowledge would not assist in determining the effects of real firing. What interests us above all, are the results obtained by applying the regulation methods of firing.

We need not recall what these methods are ; we desire simply to render an account of the probable effect which may be hoped for when they are correctly applied.

Now, it is known that, for shell fire the pointing of artillery is based upon the consideration of the normal interval. The efforts of the captain are directed to obtaining the mean point of burst for bursting shells at a distance from the objective equal to the normal interval.

This interval is almost exactly 95 m. at a 1000 m. and 65 m. at 4000 m. Between these two limits, it varies proportionately to the distance.

Summarizing, if we admit :

1. That the mean trajectory passes through the target.
2. That the mean point of burst is at the normal interval.
3. That the projectiles all burst along the mean trajectory and are distributed according to the laws of the probability of fire,

We find that the mean number of files touched by a shot in adjusted fire is for each range that which is indicated in Table XV. following. We remember that the efficiency of each shot is calculated by one of the formulas (1) or (2), in which α is made equal to zero, and which then become

$$n = \frac{2 K^2 \tan \epsilon}{l}, \quad F = \frac{2 I \tan \epsilon}{l}.$$

TABLE XV.

Efficiency in bursting fire perfectly adjusted.

Ranges. M.	Skirmishers standing.	Skirmishers kneeling.	Skirmishers lying down.	Cavalry.	Artillery.
1000	6.6	4.4	2.2	15.5	3.3
2000	6.2	4.1	2.1	14.6	3.1
3000	5.5	3.7	1.8	12.9	2.8
4000	4.8	3.2	1.6	11.3	2.4

General Rohne has calculated the effects of German field shrapnel by a similar method, but as we have already stated, he has increased by 30 per cent. the numbers which he has deduced, in order to take account of ricochets. We believe that owing to their relatively small velocity and their great angles of fall, shrapnel bullets would ricochet only occasionally and that it is better not to consider some few hits which may result from ricochet.

We will adhere to the figures in the above table, but we must not forget that these figures indicate the number of files touched by each projectile considered singly. When several shells are fired, one after the other, the same files may be hit several times. To know the true number of files placed *hors de combat* by a series of shots, we must proceed as has been indicated for infantry.

Thus for example, suppose a battery at 2000 metres distant fires 18 shots against a line of 100 skirmishers standing, of a density of 1 man to a metre. If we suppose the fire perfectly adjusted, how many files will be put *hors de combat* by these 18 shots?

Each shot giving 6.2 files touched, the 18 shots will give 111.6; each skirmisher would therefore be touched 1.1 times, which from Table IX gives 67 men *hors de combat*.

Errors in Pointing.—Thus far we have not considered errors in pointing, and we have supposed that the fire was perfectly adjusted; now this

will never occur in practice and the efficiency of fire will never be as great as we have shown.

Unfortunately the study of the efficiency when the pointing is erroneous is quite difficult and leads to very complicated formulas. We will not begin this study here. We will limit ourselves like General Rohne, to examining what the efficiency becomes when account is taken of errors which cannot be avoided. Now, the regulation method, even when correctly applied does not assure the exact elevation for the target. It gives an elevation which differs very little from that, it is true, but which does differ.

It may be admitted we believe, that with an exact pointing the elevation is determined to within 50 m. This is a maximum of accuracy which it is not impossible to obtain. If it is obtained the mean point corresponding to the elevation given by the pointing will never be at a greater distance than fifty metres over or short. If then we consider the extreme cases, that is to say if we calculate the efficiency on the hypothesis, first, that the mean point is 50 m. short, and then that it is 50 m. beyond the target, we will find the results following :

TABLE XVI.

Efficiency of bursting fire, supposing the mean point of the fire in range is 50 m. from the target.

INDICATIONS. Position of the mean point with respect to the objective (in metres).	NATURE OF THE OBJECTIVE.									
	Skirmishers standing.		Skirmishers kneeling.		Skirmishers lying down.		Cavalry.		Artillery.	
	§ 	§ +	§ 	§ +	§ 	§ +	§ 	§ +	§ 	§ +
Ranges in metres. { 1000. . . .	4.1	7.4	2.7	4.9	2.4	2.5	9.7	17.4	2.1	3.7
2000. . . .	4.0	4.2	2.7	2.8	1.3	1.4	9.4	9.9	2.0	2.1
3000. . . .	3.7	2.8	2.5	1.9	1.3	1.4	8.7	6.6	1.8	1.4
4000. . . .	2.7	0.9	2.5	1.9	1.3	1.4	6.3	2.1	1.4	0.5

By taking the mean of Table XV and XVI, we will find the values of the probable efficiency sufficiently approximate for practice.

TABLE XVII.

Probable efficiency of bursting fire.

RANGES.	KIND OF OBJECTIVE.				
	Skirmishers standing.	Skirmishers kneeling.	Skirmishers lying down.	Cavalry.	Artillery.
m.					
1000	6.0	4.0	2.0	14.1	3.0
2000	4.8	3.2	1.6	11.3	2.4
3000	4.0	2.3	1.6	9.4	2.0
4000	2.8	2.3	1.6	6.6	1.4

Mean effect of pointing shots. In the calculations which we have just made, we have not taken account of pointing shots which are nevertheless productive of results. We may neglect, it is true, percussion shots, which have no effect unless they fall in the immediate vicinity of the objective, but for bursting shell, it is otherwise. Unfortunately we need positive knowledge on this point, so the figures which we will give and which result from our personal observation are probably susceptible of modification. We will adopt them however, for want of better.

Against a line of skirmishers standing, of a density of one man per metre, placed at 2000 m., we may admit that the pointing under normal conditions would require from 8 to 10 shots, or 9 shots as a mean; these 9 shots will put about 20 per cent. of the files *hors de combat* and will not be fired in less than 6 minutes. In regard to the number of pointing shots, we may adopt the same values against skirmishers kneeling; but against artillery or skirmishers lying down, the pointing will be more difficult on account of the discontinuity of the target and we think that the number of shots necessary should be estimated at 12 as a mean and the duration of the pointing at 7 minutes, always at the range of 2000 m. Beyond 2000 m. these numbers will increase with the distance, according to the common law, which is easy to state and easy to remember. The number of pointing shots and the time necessary for this operation must be increased by 3 shots and by one minute for every 1000 m.

It may be admitted that these figures will decrease according to the same law at ranges below 2000 m. However, below 1000 m. the numbers found from this law must be slightly diminished.

It is easy now to calculate the mean effect of a pointing shot. If on a line of skirmishers standing at 2000 m. the pointing gives 20 per cent. of files touched, this corresponds to a proportion of 20 files touched in 100 skirmishers, which requires according to Table IX, 0.22 hits per file, or 22 hits per 100 skirmishers. These 22 hits being caused by 9 shots, that gives $\frac{22}{9} = 2.4$ hits per shot, that is to say $\frac{1}{2}$ of what is caused by a projectile in adjusted fire.

What we have just said for the range of 2000 m. applies equally well to other ranges and other objectives. We will then consider pointing shots as giving a mean of $\frac{1}{2}$ less files touched than shots in adjusted fire.

Rapidity of Adjusted Fire.—We have now to determine only the rapidity of adjusted fire. This fire will be naturally much more rapid than during the pointing period. The Germans estimate that 15 shots per minute can be fired in rapid fire for a short period of time, but this rapidity will be altogether exceptional and we think, therefore, that in the majority of cases one can count only on ten shots per minute for distances below 3000 m., on 8 shots from 3000 to 4000 m. and on 4 shots only for distances beyond 4000 m. These rapidities are moreover sufficient to lead to a rapid destruction of the adversary.

USEFUL EFFECT OF ARTILLERY FIRE.

If we admit the preceding values, we can very easily obtain the number of hits per minute by multiplying by 10, 8, and 4, according to the case, the numbers given in Table VII.

Number of Shots and Time Necessary to Put a Troop hors de combat.—The data which precede enable us to calculate the number of projectiles and the time necessary to put a troop hors de combat. The following method is the same as in the case of infantry:

Let us suppose that we wish to inflict upon the enemy a loss equal to 45 per cent. of his effective and let us consider successively the different objectives with which we have been occupied thus far. We will find the number of projectiles and time necessary for a battery to destroy its adversary. This is how we will reason in the case where the objective will be for example, a line of skirmishers standing at 2000 m. From Table IX, in order that any troop whatever may lose 45 per cent. of its effective, it is necessary that each file shall receive 0.6 of a hit, or to speak more exactly in speaking of artillery, may be touched 0.6 times. Now, the pointing shots to the number of 9 put 20 men hors de combat. There will remain then 80 of whom 25 must be touched by adjusted fire, that is 31.25 per cent. In order that this proportion may be obtained, it is necessary that each file be touched 0.37 times. But at 2000 m. against a line of skirmishers standing, the mean efficiency is 4.8 files touched per shot. In order that each file may be touched 0.37 times, it will be necessary to fire a number of shots equal to

$$\frac{80 \times 0.37}{4.8} = 6.1 \text{ or } 7 \text{ shots.}$$

These 7 shots will be fired in 7×6 equals 42 seconds and, as the pointing requires for itself 6 minutes, the total duration of the fire will be 6 min. 42 seconds, and the number of projectiles expended, 17.

The table on next page indicates the results obtained by applying this method of calculation to the different objectives. We have not included those which are obtained in the fire against cavalry, because knowledge with respect to this arm is lacking.

Just as for infantry, this table may serve as a guide for drawing up problems of fire for artillery. We make no pretensions, however, of having given figures which are absolutely exact and invariable; we have only wished to indicate the methods proposed by General Rohne in order to direct in a rational manner the firing exercises of artillery and of infantry. The elements are wanting, in fact, to settle the exact value of the different factors which influence the useful effect of fire: rapidity, duration of the pointing, number of shots in pointing, efficiency of these shots, practical errors of the fire, etc. We have only indicated the values which seem to us the nearest to the true ones, but to solve the question with certainty, methodical experiments should be conducted. However that may be, we can still utilize the results which we have found, to

compare the relative effects of the two arms ; that is the main end of this study.

TABLE XVIII.

Number of shots and time necessary to put 45 per cent. of the effective *hors de combat* in a line of 100 skirmishers standing, kneeling or lying down, or in a battery served by 47 men.

KIND OF OBJECTIVE.	Ranges.	NUMBER OF SHOTS NECESSARY.		Total of shots fired.	TIME NECESSARY.		Total duration of fire.	NO. OF FILES TOUCHED.	
		For pointing.	For adjusted fire.		For pointing.	For adjusted fire.		During the pointing.	During the adjusted fire.
Skirmishers standing.	m				min sec	min sec	min sec		
	1000	5	6	11	3 0	0 36	3 36	15	30
	1500	7	7	14	5 0	0 42	5 42	17	28
	2000	9	7	16	6 0	0 42	6 42	20	25
	2500	10	8	18	6 30	0 48	7 18	20	25
	3000	12	8	20	7 0	1 0	8 0	22	23
Skirmishers kneeling.	1000	5	12	17	3 0	1 12	4 12	10	35
	1500	7	12	19	5 0	1 12	6 12	12	33
	2000	9	13	22	6 0	1 18	7 18	13	32
	2500	10	15	25	6 30	1 30	8 00	13	32
Skirmishers lying down.	1000	7	25	32	4 0	2 30	6 30	7	38
	1500	9	25	34	6 0	2 30	8 30	8	37
	2000	12	29	41	7 0	2 54	9 54	10	35
Artillery (47 men.)	1500	9	16	25	6 0	1 36	7 36	7	14
	2000	12	17	29	7 0	1 42	8 42	8	13
	2500	13	18	31	7 30	1 48	9 18	8	13
	3000	15	19	34	8 0	2 22	10 22	9	12
	3500	16	24	40	8 30	4 0	12 30	9	12
	4000	18	30	48	9 0	7 30	16 30	8	13

III. COMPARISON OF THE EFFECTS OF FIRE OF INFANTRY AND OF ARTILLERY.

General Rohne truly observes that to make this comparison we should establish the basis on which it is to be made. Shall we compare the fire of a company, of a battalion or of an entire regiment with that of one, two, three batteries or even more? The results will vary naturally very much according to the units chosen. What seems most rational is to consider units having the same front, because the front is the important element to be considered in a line of battle.

Now, a battery forming a part of a group occupies in round numbers 100 m. Within this length, the infantry can place in line a maximum of 133 skirmishers owing to 1 man per space of 0.75 m. These are the

two units which will serve us as a basis for comparing the effects of fire.

This comparison can be made in two ways, first, from the point of view of firing on the same objective, then from the point of view of a combat of infantry against artillery. The question is examined successively from these two points of view.

Comparison from the Point of View of Firing on the Same Objective.—The problem may be formulated as follows: As between a battery of artillery and a line of 133 skirmishers, which of these two units is the more dangerous one to have as an adversary? The reply to this question is easy.

The effects of infantry fire are given by Table X. If we multiply the figures of this table by 1.33 and then compare them with those of Table VII, we find that the line of skirmishers at 1000 m. produces as much effect as the battery at 2500 m. The infantry then will remain inferior to the battery, so long as it is not at less than 1000 m. from the enemy.

We do not wish to draw conclusions from this fact from the point of view of tactics; we limit ourselves to stating it. We have supposed the distance known by the infantry; if it should be otherwise, the difference between these two arms will be still further marked. It is easy to see, in fact, that the superiority of the artillery is maintained in this case even when the fire is not absolutely adjusted, provided that the fire may be sufficiently accelerated.

At 1200 m. for example, the line of skirmishers will obtain in one minute, if the distance is not known, $12.5 \times 1.33 = 16.6$ hits. At the same distance, the battery, the fire of which will be regulated to within 50 m. short and which would fire 4 shots in a minute, a rapidity very easy to maintain, would obtain the same number of hits against skirmishers standing.

Comparison from a Point of View in a Combat Between Infantry and Artillery.—The situation is different when we consider the combat of infantry against artillery. In such a duel the question is to know which one of the two adversaries will reduce the other to silence, that is, on the hypothesis which we have admitted which will put 45 per cent. of the other's effective strength *hors de combat*.

Let us suppose first that the two adversaries are 1500 m. apart and that neither knows the distance, the problem is to know how much time will be necessary for each one to put the other *hors de combat*.

The artillery requires 7 projectiles for adjusting its fire (sighting shots). These seven projectiles if the enemy's skirmishers are standing, will cause according to Table VII, a number of hits equal to $7 \times 1.33 \times 2.7$, or 0.19 hits per skirmisher. These sighting shots will put 17 per cent. of the files *hors de combat*, or 0.17×133 equals 23. The total number of files which the battery must put *hors de combat* is 0.45×133 equals 60. After the adjustment there remain standing 110 files, of which 37, that is 34 per cent., must still be reached by adjusted fire.

In order to reach this per cent., according to Table IX, each file must

be touched 0.41 times ; the number of shrapnel fired to obtain this result will be $\frac{0.41 \times 110}{5.4}$ equals 9 in round numbers. These 9 shots can be fired in 54 seconds. In five minutes and 54 seconds, therefore, the battery will have performed the allotted task.

As to the skirmishers at 1500 m., they should obtain a mean of 0.6 hits per file, that is 28.2 for the whole battery. Now in 1 minute they obtain $\frac{5.9 \times 1.33}{2}$ equals 4; it will therefore require 7 minutes to reduce the battery to silence ; so the artillery will have the advantage.

An analogous calculation would show that the battery will still have the advantage, even if the enemy's skirmishers were kneeling, for then it would employ 21 projectiles (7 for sighting) and will occupy 6 minutes and 24 seconds in executing its fire.

It might be objected to this method of reasoning that the pointing period is critical for the battery ; that during this period it is exposed to greater losses than it inflicts on its enemy, and that consequently it will be completely destroyed before having commenced the adjusted fire, the only really efficacious fire. A very simple calculation enables us to find the losses from minute to minute felt by the two adversaries and shows that this objection is not serious. The following in effect is the result of this calculation :

1. Losses met with by the skirmishers while the battery is adjusting its fire. (Duration of sighting shots equals five minutes.)

During the 1st minute	5 men	remaining effective	128
" " 2d "	4.9 "	" "	123.1
" " 3d "	4.7 "	" "	118.4
" " 4th "	4.5 "	" "	113.9
" " 5th "	4.3 "	" "	109.6

2. Losses borne by the battery during this adjustment.

During the 1st minute	3.9 men	remaining effective	43.1
" " 2d "	3.5 "	" "	39.6
" " 3d "	3.1 "	" "	36.5
" " 4th "	2.7 "	" "	33.7
" " 5th "	2.3 "	" "	31.4

Now with 32 men the battery is still perfectly able to sustain the struggle, especially if its fire is adjusted.

It is useless to follow up these examples which show how very important it is for artillery to reduce to the lowest possible limit the duration of its pointing. The infantry on its side has the greatest possible interest in learning as exactly as possible the distance of the objective in order to increase by that means the efficiency of its fire.

We have assumed in what precedes a line of skirmishers having the maximum density. The superiority of the artillery would be more

strongly arraigned if the line had been less dense. It is therefore evident that when a line of artillery is to be attacked by infantry, the forces of the latter should be deployed as much as possible.

If we suppose that the adversaries approach within 1000 m. of each other, we will find by a calculation analogous to the preceding (which need not be given here in detail), that the artillery should fire for 3 minutes and 54 seconds, and expend 14 projectiles in order to overcome its adversary, while the infantry would have to fire only 3 minutes and 30 seconds. There is apparently a slight difference in its favor; but this superiority, let us not forget, is owing to the rapidity of its fire of 5.5 shots in a minute which it would find very difficult to maintain for so long a time.

CONCLUSION.

What can be concluded according to us from this somewhat arduous study, in which figures have been necessarily piled up, is that artillery should not exaggerate the effects of infantry fire. As General Rohne has said, one is led by military works as well as in the admirable manœuvres to place too high a valuation on the effects of infantry fire. "One often sees," says this general officer, "in grand manœuvres the artillery beat a retreat before a line of skirmishers, under little or no cover, rather thin and distant 1000 m. and sometimes more, whereas it could very well have opened the struggle with great chances of success." The German regulation on field service is therefore right in saying that artillery can engage the infantry even at the distance of 1000 m. The situation of the artillery becomes really critical only when the infantry can approach it under cover and open fire by surprise with an elevation as exact as possible, and also when the artillery is taken in flank by the enemy's skirmishers. In this case, the fire of musketry is efficacious, interferes with the sighting shots and prevents the artillery from replying to its adversary.

In conclusion we will repeat what we have already said in the course of this paper, and that is that we make no pretension of having given mathematically exact values of the useful effect of service firing, but we believe that the numbers which we have deduced are sufficiently approximate to permit comparisons and interesting studies. The methods which we have indicated may be useful in finding the efficiency of the fire under circumstances and on objectives different from those which we have noticed, and will furnish accurate replies to questions which, if otherwise treated, would remain in a state of vagueness. We leave to others the care of solving some of the numerous problems which we could not think of touching. Our aim has been simply to make known the manner in which the questions of fire are treated in Germany, and to show how the ideas of our neighbors can be applied to our small arm and to our field piece.

VON LÖBELL'S ANNUAL REPORTS ON THE
CHANGES AND PROGRESS IN MILITARY MAT-
TERS DURING 1896.

PRÉCIS BY COLONEL H. T. HILDYARD, COMMANDANT STAFF COLLEGE.

(*From the Journal of the Royal United Service Institution.*)

INFANTRY, CAVALRY AND ARTILLERY.

THE present number of the valuable military annual that still bears the name of the distinguished officer who originated, started, and for many years superintended its publication, is the twenty-third. Notwithstanding the improvements introduced from year to year in form and matter, while under the direction of Colonel von Löbell, his successor has still found room for the introduction of new matter that cannot fail to prove of interest to every military reader.

In his preface, Lieutenant-General von Pelet-Narbonne refers briefly to the changes that have been made by him. In the first part, the Budget, especially the Army Budget of each State, the forces of which are dealt with, is gone into more closely, and the establishments of tactical units in peace and war are given, so far as they are known.

In the second part, a valuable addition is made to the chapter hitherto reserved for the tactics of infantry, by including in it the consideration of the action of the several arms in combination. H. H.

INFANTRY TACTICS.

The publication of General von Verdy's third and concluding part of "Studien über Felddienst" leads to some remarks. It deals with rear-guards and flank detachments, and particular attention is given to the imparting of orders in the field. This opportunity may be taken of pointing out how much the present conditions of fighting have increased the difficulty of conveying orders to the infantry in the first line, and it is questionable whether sufficient weight is given to this in peace training. But the influence of the framing and imparting of orders has so much influence on tactical success or miscarriage, that the chapter on the subject deserves earnest attention.

The finest tactical conceptions and arrangements are valueless in practice, unless they can be converted into practical procedure. Formerly these difficulties were much less, because use could be made of the command by word of mouth, even in the closest proximity to the enemy. Command as such, the controlling of the troops with the voice, is now only practicable up to the company inclusive, and then only when outside the sphere of effective fire.

The regulations do not attribute sufficient importance to this. Everywhere troops are still given commands; even regiments and brigades are

still commanded by word of mouth, and the French regulations even lay down that during the fight the regimental commander shall intervene in critical situations with "loud, energetic command."

Until the regulations are freed from such unservice like ballast, a simple, clear, and really practicable mechanism of command will not come into existence. In this respect the other two arms of the service are in advance, for they can get some assistance from signals. The practice is a survival of the habitudes of the drill-ground, which are in contradiction with the principle that "the troops shall not have to abandon in the field what they have learnt on the drill-ground." As a fact, the battalion commander in war can, at the most, give the command "Stand to! Unpile arms!" Notwithstanding this, the regulations contain all sorts of detailed instructions regarding the drill of battalions, regiments, and brigades by word of command. But commanding or drilling are purely mechanical exercises—a means to the end, as regards discipline—which have little to do with leading or with imparting orders in service conditions. Consequently, it is often seen that the performances of the so-called good "drill" are of little value when it is a question of bringing up and engaging troops; when, in a word, it is a matter of preparing the tactical decision and remaining master of the tactical situation, so far as this is possible.

It remains now to be pointed out that the ample peace apparatus, with its organs of command; the riding about of the commanders and adjutants, even at close distances; the frequent reports received, even during the action; the personal intervention of the superior commander,—would in war suffer such limitations that a mechanism of command which is accustomed to work with the assistance of these factors can only be regarded as a failure.

But tactical success depends, in the first place, apart from moral considerations, upon the tactical method being good, and this again is dependent upon the peace training. By "method" is understood principally the tactical procedure, and this is inseparable from the manner in which the apparatus of command operates. In the past year the number has increased of those who place great value upon tactical method in contradistinction to those who think they can overlook the dangers of the so-called free procedure.

This question is cleverly dealt with from the larger points of view by the Austrian Lieutenant-Colonel Freiherr von Binder-Kriegelstein, in "*Geist und Stoff im Kriege*." Amongst other points, he comes to the conclusion, based on military history, that the worth of the military implement is the true secret of success in war; and not the superior higher leading. The military implement, however, appears only to be good when it is capable of extraordinary tactical performances; and it is these again which frequently bring about, as if of themselves, the so-called strategical successes.

The "tactical reports" have for years raised the demand to base the

tactics of infantry on the set battle. This has not been from prejudice against the tactical confusion with small bodies, which may be of use, within definite limits, especially for the training of leaders, but because the form of future wars will be infantry fighting in large masses in a comparatively narrow space, for which end tactical habitudes of detachment warfare could only act detrimentally. This applies not only in regard to tactical leading, but also to the tactical procedure, including the formations adopted. This tendency, supported by the experiences of the Franco-German War—in which detachment warfare played no rôle up to and including the battle of Sedan—has made progress during 1896. Especially in Germany it was directly promoted by the extensive exercise-grounds, which allow of working in service conditions in large bodies.

As regards the planned attack, a welcome advance has been made during the year, in so far as the theory of a near approach without firing has become more and more untenable. Such a procedure is the exact reverse of sound tactics, because it is impracticable in war, and, viewed clearly, is only veiled shock-tactics, which in 1866 and 1870-71 ended wherever they were carried out in tactical failure.

Looking, however, to the fact that the conflict in regard to the infantry attack has not yet been settled, it may be worth while to consider the phases of such an operation from the deployment for action up to the final charge, with special reference to the opposing views on the subject. By this course also the best opportunity will be given the reader to form his own judgment regarding the utility of either method. By utility, it is to be understood, in the first place, practicability before the enemy under similar physical and moral conditions. But this is not sufficient, looking to the strife of opinions, to gain fixed points for an unbiased judgment; for without such points, particularly in tactical matters, there is the danger of unprofitable discussion, greater in degree according as an attempt is made to rely on the authority of one or other of the regulations. Regulations have not always been the means of tactical progress, and a scientific discussion of definite tactical questions would fall through from mental constraint if the regulations were to be regarded as infallible.

Besides psychology, there are also to be considered as fixed points the experiences of military history and ballistics. The last stands in so close a connection with the psychology of the fight that the endeavor to fathom the nature of tactics without both can only lead to a dull, purely mechanical result. During the past year ballistic bases have been created for certain tactical questions, which, in the future, no one who occupies himself scientifically with these questions can afford to ignore. It is the writing of Lieutenant-General Rohne, "*Das gefectsmässige Schiessen der Infanterie und Feldartillerie*," which can also claim importance in the direction of practical teaching; for in the tactical training of infantry shooting suitable to service conditions must rightly play

a great rôle, and whoever directs it may learn many practical things from the above-named work. The second work is by the Italian General Massa, and it offers equally much valuable ballistical tactical material, though it is specially based on the new Italian rifle. ("La Fucileria colli Arme Nuove," 1896.)

To revert to the discussion of a planned attack by infantry in normal conditions, something like the following general points suggest themselves. The attack must be carefully prepared, and must never be engaged too hastily. Fighting out of hand will lead, in ninety cases out of a hundred, to serious disadvantages. The attack must be preceded by careful reconnaissance, so far as this is possible. This phase comes under the chapter "*Führung*," also under that of "*Organisirung des Gefechts*," and is of great importance to the further development of the action. Too much calmness and consideration cannot be demanded for this. If it be, according to Moltke, very difficult, often even impossible, in the domain of strategy, to rectify errors made in the first concentration of troops, this applies equally, tactically, to the assembly or engagement of large infantry masses.

It is frequently the custom to give the order for forming up before that for attack. This is not superfluous, if the formation be made sufficiently early from the deep columns of march into mass. In any case, by doing this the simultaneousness, the similarity, and with them the weight of the attack, will be promoted. The order for forming up has only to specify the points up to which the masses are to be moved, with a view to halting at them temporarily. These points must be situated out of the enemy's artillery fire. Then first begins the actual tactical reconnaissance, and, in connection with it, the orders are given for the engagement or attack. In doing this the hurry and flurry so frequently to be observed in peace should be altogether avoided; and calm, coolness, and circumspection are more than ever absolutely necessary, because, once the orders for attack have been given, changes of direction, movements of troops hither and thither, etc., can only lead to disadvantages. In this, as generally in war, it will, as a rule, lead to better results to carry through with energy a measure not altogether free from objections, than to change it subsequently.

In the deployment of the infantry masses into fighting formation, different views obtain as regards the distance from the enemy. Here and there it is taught that they must be as near as possible to the enemy. It stands to reason that for the execution of the attack it is more advantageous, both on technical and moral grounds, that the deployment shall be made as late as possible. In broken ground, cover from artillery and the distant fire of large bodies of infantry, as is usually employed in Russia, France, and Austria at these distances, may be available; but it is to be doubted if this will be the rule, having regard to the defenders, for whom an extensive, open field of fire is, and will continue to be, a fundamental requirement. It can, however, not be regarded as

answering war conditions, if the attacker lays down ideal situations, so as to lessen the difficulties of the infantry attack. If it be one of the advantages of the strategical offensive that it prescribes the law to the opponent, it is the reverse in the actual fight, that is to say, the attacker must in his tactical measures follow those of the defender. But this period is not always fairly considered, and so tactical representatives ensue favoring the attack, which appear to be more or less arbitrary.

From these considerations, it seems desirable to forego all illusions in the matter of the engagement and execution of the infantry attack, and always to keep in view the most difficult problem of attack, that on a prepared position, with an open field of fire up to the limit of effective artillery range (2500 metres to 3000 metres). Then follows the result, that the preparatory position for the infantry will in favorable cases be situated at this distance, and that from this distance must be practised rapid and secure deployment. In this first deployment is to be understood the fixing of the framework of the whole of the infantry to be employed in the attack, at least a division; if the approximately simultaneous advance of the infantry in the army corps can be attained, that would be the nearest approach to the ideal of an infantry attack.

The time for the organizing of the most united advance practicable of the infantry is near; there can be no doubt of it, for the artillery engagement in modern battles occupies hours before the infantry is launched for the decisive advance. There is no lack of means for the organization of an infantry attack in its broad outlines, provided the allotment of objectives, the indication of frontage down to individual battalions, the precise distribution of the several lines including approximate estimates of distances, detailing of the connecting troops, etc., have taken place previously. Even the existing advanced guard theory, now in practice, need form no hindrance to such a procedure, for, according to this theory the advanced guard should cover the forming up of the troops to be employed, so that it must be possible for these to be organized for the purpose beforehand. The arguments also frequently advanced against the possibility of a "normal" arranged attack on a large scale, which are borrowed from the assumed *rencontre*-type of future battles, are not for the most part tenable, unless we are to accept tactical procedure by portions as normal.

Though it is not immaterial, at least for the tactical result, in what manner the first act, just described, of the employment of infantry, in the battle is arranged, still greater tactical interest attaches to the following phase, viz., the advance of the infantry in the sphere of the enemy's fire. Here, so far as tactical peace training is concerned, there is practical unanimity as regards the one cardinal point, that an attack, once it has been launched, must be carried through with the utmost resolution until the charge with the bayonet. This principle appears sound, but more on the ground of training than from the probable

character of the future battle, especially when one is of opinion that the next struggle will bring out unexpected scenes, and that a much greater rôle is reserved for the war of positions than is recognized by the tactics of the present, based generally on battles in the open field.

For the present, however, we have to do with the latter, so the importance of a determined carrying through of the infantry attack can rightly be emphasized; also because the ideas in regard to the so-called tactical demonstration and tactical decision not seldom lead to some confusion as to the degree of energy to be displayed in the infantry attack. Here again it is detachment warfare that has to bear the chief blame, with its more or less strategic foundations, which allow of demonstration and manœuvre to a degree that is excluded from real war. In the latter, there is only one law and one mode of action: straight on and forward in the face of an enemy well covered and difficult to recognize! But it is in this that exists the difficulty of the problem, which many tacticians regard as a sphinx, whose secret will only be disclosed by the next war.

Others wish to lighten the solution of the problem by claiming the assistance of ground as an important factor for the attacker. Happily, there is here also a point of agreement for the different views, which is the nearly unanimous conviction (only the official Russian tactics are temporarily the exception) that the success of an infantry attack is dependent upon gaining a superiority of fire.

This is undoubtedly most easily obtained by concentric fire—it was for this reason Napoleon desired concentric fire, for he denied the decisive effect of frontal fire—which is synonymous with turning the defender. But in the majority of cases the infantry attack must renounce this means, for it is only given to a fragment of the attacking infantry to operate by concentric fire. In the battle of St. Privat-Gravelotte, the type of ordered battle, $3\frac{1}{2}$ German army corps had to carry through a purely frontal fire action. In any case, no procedure of attack can be based on the possibility of flanking fire.

No alternative, then, will be available but to achieve superiority of fire by mechanical methods; a problem, therefore, exclusively of a technical nature, at least for tacticians, who can reckon only with equal factors (moral, training, armament).

By obtaining the superiority of fire is to be understood, tactically, the physical and moral shaking of the defender; or, to reduce it to a fixed formula, the attacker must, in the so-called decisive fire position, understand how to cause the defender such great losses that his moral courage will be annihilated, to follow Clausewitz.

How now can the attacker reach this decisive fire position, which, logically, is the preliminary condition to securing the superiority of fire and its tactical results?

Some tacticians make it quite simple, and say: The attacking infantry advances without stopping, after it has changed from the rendez-

vous formation to fighting formation, right up to the main position, regardless of losses; and here defeats by superior fire the defenders, who, through this fearless advance, have been thrown into a condition of moral depression. If this recipe were capable of being put into execution, it would imply an enormous simplification of infantry tactics, and it would no longer be necessary to puzzle over the best way in which to reach the main fire position. But if we examine war experiences, and the lessons of ballistics, this procedure breaks out as pure review tactics, which in war may be reckoned to result in failure with almost mathematical certainty.

That a brave infantry should not fear losses, is so self-evident a proposition, that words need not be wasted on it, or on this other: that a so-called humanitarian tactical procedure is a chimera.

On the other hand, the object of the fight is tactical success, victory, and not the heroic consciousness of being honorably struck down. But a body of troops which advances continuously, even assuming loose formations, which will be forced upon them naturally, even at a long distance, up to the decisive fire position, will suffer on the way, according to the evidence of ballistics—such losses that they will no longer be in a condition to open an overpowering fire; for this, in the first place, is dependent on the number of rifles. And if the attacker does open fire from this position under such unfavorable conditions, there is no reasonable supposition that the defenders will be crushed.

The views in regard to the distance from the enemy of the main fire position vary from 700 metres to 400 metres; probably it is on the borders of close ranges, or from 500 metres to 600 metres. Rohne estimates that 100 men, allowing for errors in estimating the distance, firing at 700 metres at figure targets, make 44.3 hits in the minute, at 600 metres 63 hits, at 500 metres, 100 hits. After reducing these results materially for service conditions, looking to the circumstance that the defenders will on an average open fire at 900 to 1000 metres, and that consequently the attackers between this distance up to 600 metres or 500 metres (following the theory of continuous advance up to the main fire position) must move as targets, the smallness of the chances of an enemy after sustaining this fire gaining a superiority of fire from 500 or 600 metres is self-evident. If the attacker fills up losses, the defender can do the same. This filling up, however, must equally take place under the defender's fire, and even if the attacker should succeed finally in bringing a rifle into action to every metre of front in the main fire position, it will have cost him much greater sacrifices than the defender will have suffered; so that the latter will be able at the close of the action to rely upon much more material for repairing losses than the attack. On the ground of the production of these proofs an end must at last be made of proclaiming as a tactical precept the continuous advance up to the main fire position. The doctrine that the attacker from the outset must work with their skirmisher lines, which should be gradually

thickened into a superior firing line in the main position, is similarly situated. It stands and falls with the proof as to whether the greater percentage of loss is to be looked for with the thin or with the thick skirmishing line. Rohne says: "Let us imagine two equally long lines of skirmishers lying down (head and shoulders targets), firing at one another at 500 metres distance. Their length may be taken as 80 metres. The one skirmisher line has the closest intervals permitted by the regulations—one pace per rifle, 0.80 metre—the other the widest permissible—two paces per rifle. The closely-formed skirmisher line will consequently have 100, the more openly formed line 50 rifles in the front line.

Assuming equal musketry training, both will make exactly the same number of hits, for the stronger line which fires double the number of shots will in the same time make only half as great a percentage of hits, because its target is only half as thick as that of the weaker line. If four shots a minute per rifle be assumed, 92 hits will be made in five minutes by each detachment. In the stronger detachment by the calculations given 60 per cent., therefore 60 figures will be hit; in the weaker, 84 per cent., or 42 figures. In spite of the greater losses, the stronger detachment will still have the advantage, for, after deducting the casualties, it will still have 40 rifles in action, the weaker detachment only 8. Whereas at the commencement of the action its superiority was as 4.1, it will now be 5.1 in favor of the thicker skirmisher line." "Sparring" tactics, which would operate at the outset with their skirmisher lines, is as little calculated to gain superiority of fire as are sharp tactics, which seen clearly, are characterized by a continuous advance up to close distances.

It may, however, be remarked that in the first phase of the engagement, a chain of battle patrols in the form of a screen of skirmishers should be extended in front of the framework formed by the foremost line of the deployed troops. In the French infantry these battle patrols have been embodied by regulation in a fixed system (32 men per company led by an officer); but the utility of this measure is prejudiced by the excess of strength employed. As the French battalion in forming part of a larger formation always extends two entire companies for the advanced fighting line, there are 64 *éclaireurs* in front of it, and the reproach met with here and there of "*éclaireurs gêneurs*" is justified. A screen of skirmishers of moderate strength—8 to 12 per company—advancing 400 to 500 metres in front of the foremost fighting line, affords protection from surprise, facilitates reconnaissance, guards against premature development of the skirmishing line, and serves at the same time as the outline for this when its enemy has been approached sufficiently near to commence firing. By the restriction in numbers of these battle-patrols here indicated, the danger is avoided of their engaging in a kind of preliminary action before the actual skirmisher line has taken up its first fire station.

There are differences of opinion as to the manner in which the several

infantry lines should be distributed from the first deployment until the first fire station is occupied, and how they should move forward. There are questions whether all close formations are to be avoided, and whether two ranks, rank entire, or opened-out single rank, etc., are to be employed. In view of the increased effect of fire, the tendency is more and more in favor of the loose least vulnerable formations, and it seems that the opened-out single line (therefore a kind of skirmisher line) has, on ballistic grounds, the most prospect of later general employment, even for the rearmost lines; tactical grounds favor it also, for by means of it the change to skirmisher formation, which sooner or later is inevitable, is facilitated.

As to the distance from the enemy of the first fire station, different views also prevail, but there is a tendency to leave out of consideration, as tactically untenable, the plan of having only one fire station as near as possible to the enemy; equally it is not worth discussing the objection often raised that the choice of the first fire station depends upon the ground. An enemy who leaves, in the most complaisant manner, the choice of the ground to the attacker must be a rarity; in any case, no tactical system can be grounded on this supposition.

The views in regard to fire being opened by the attackers are very far apart. There are advocates of distant fire who would open fire at 1600 metres, or certainly at 1200 metres, and this is almost exclusively the case where volleys are to be employed at long ranges. On the contrary, it is held, and especially in Germany—and this results again from the fundamental preference for individual fire—that fire should be opened at the earliest from 1000 to 800 metres. This principle seems tactically more correct, because in the first place it limits the expenditure of ammunition, it supports the energy of the endeavor to get forward, and sufficiently regards the psychological moment, in that the attacker under effective fire will also use his rifle.

Excepting in Russia, there is practically unanimity, that the advance from the first fire station to the main fire position must be carried out by rushes. Equally in regard to the advance by rushes of the advanced line being carried out in concert with the pushing forward of reinforcements; and, finally, there is agreement that the fighting line in the main fire position must be enabled to maintain the utmost possible fire effect by the sending up of ammunition and reinforcements.

If the attacker is numerically very superior to the defender, he will be able to turn him, or if he is supported by a more effective artillery fire, he may be in a position to break down by fire the enemy's power of resistance.

But if these factors are not in his favor, it will be very uncertain whether the attacker will be in a position to so break down the defender from the main fire position as to venture on the assault with any prospect of success. In proof of this it may be stated that, according to Rohne, out of 100 rounds with fixed sights—which should be the rule at short

distances—at whole figure targets at 500, 400, and 300 metres, the hits were 31.7, 35.2, and 37.7, respectively; whereas, at head targets, there were only 5, 6.2, and 8.4 hits. Thus the superiority of the defender, who is lying down under cover (head targets), over the advancing attacker (whole figure targets), as regards the effect of fire, is increased from four to sixfold within the actual zone of the assault. The further consequences follow of themselves, if one is of the opinion that the attack with the bayonet must be carried out without firing.

At this point, however, we are met by differences of opinion. It has been stated that it is impossible to traverse at the double the distance from the main fire position of 600 to at least 450 metres; and we must agree, if we consider that the exhausted infantry soldier, burdened with about 30 kilogrammes, can with difficulty traverse this distance at all at the double, particularly in unfavorable conditions of ground. Further, it is not practicable to renounce firing altogether during the assault, for that will only encourage the defender to further resistance. There is the necessity, then, for firing; the difficulty is, which of the methods proposed is the most suitable in service conditions. One is that a so-called fire guard should be formed; that is, a part of the firing line remains lying down and keeps the enemy under fire, while the other part carries out the assault. Others would adopt firing while in movement; not alone on ballistic grounds, but also on psychological grounds. Those, finally, who are opponents of firing while in movement, would have a final fire position in immediate proximity to the defender, to meet the eventuality of a revival of the defender's fire during the assault.

As regards the fire guard, in the main it protects the advancing troops only from neighboring fire, but not from frontal fire; and the throwing themselves down again at from 200 to 300 metres from the enemy will in most cases be synonymous with the collapse of the energy of the attack. But, relatively speaking, the best method is that of firing in movement, only, be it observed, from assaulting distance; for its adoption at long ranges seems a tactical error, and it is attributable chiefly to this exaggeration that firing in movement frequently fell into discredit. Besides this, officers experienced in war are of opinion that during the assault the men will utilize fire on their own account, in which case it is much better to organize the matter in the peace training.

The following is a general summary of the infantry attack, as its procedure may be derived from what has been said in the preceding pages:

The first deployment takes place from the preparatory position, according as the object and direction of the attack dictate. Broad fronts must be chosen for it, so that an immediate change to fighting formation (long skirmishing lines) may take place at a distance of from 1800 to 1600 metres from the enemy. Equally, the distribution in depth is so arranged that, generally speaking, the second and third lines have only to move straight on to be in a position to reinforce the advanced fighting

line. The reserves remain massed in a suitable position until it is clear how and where they will be employed.

The advanced fighting line is to be made as strong as possible from the outset. It is preceded by a slender line of battle-patrols, which will halt at from 1000 to 800 metres from the enemy, at which distance the skirmisher swarms that are following them open individual fire.

The further advance is conducted chiefly by rushes up to the main fire position, 600 to 500 metres from the enemy. The lines in rear follow at first, with at least 250 to 300 metres distance, in opened-out single ranks. They are intended to keep the advanced fighting line up to the greatest practicable strength, for otherwise it is impossible to secure the superiority of fire. In this a gradual diminution takes place of the distances between lines.

The actual assault follows—after superiority of fire has been gained—by a continuous movement, in which firing in movement appears applicable if the enemy opposes the attack.

It stands to reason that, following the changing circumstances of the engagement, the infantry attack may take a different form. But it is wise only to fix in broad outlines a course of action for the tactical requirements of infantry in battle. The advantages in war of this are that it facilitates a definite method of peace training, and avoids uncertainty, and even waste of power, which can only act detrimentally, and affects the tactical confidence of officers and men. If, finally, it is left to every superior commander to adopt the technical, tactical methods he thinks best, by the change of commanders a continual change in this regard will be inevitable. The disadvantages of this for tactical instruction, and for a solid fighting organization of the infantry, are evident. Such a course has nothing whatever to do with the restriction of the leader's independence and free action; both belong to the sphere of psychological training, whereas there is here only a technical question.

Further, the adoption of a fixed method of procedure facilitates the coöperation of the forces, and as a consequence the unity of their employment, which must be regarded as of great value, and spares the leaders of every rank much time and trouble by having to regulate during the actual fighting details of a technical nature.

THE EMPLOYMENT OF CYCLISTS IN THE FRENCH ARMY.

Special attention has been directed to the experiments that were made in France in 1896, as to the employment of cyclists for fighting purposes. There is nothing new in the use of cyclists for reconnaissance purposes—they are to be found in every army; but great hesitation was experienced as to their value as fighting troops, as is usual in regard to most novelties in the military domain. As early, however, as 1895, Germany made an experiment on a small scale in one army corps during the manœuvres. The French military administration have taken the initiative, so far as having last year special cyclist detachments formed, which were exercised

in different circumstances. Most attention was drawn to a cyclist company that was formed in the 87th line infantry regiment, under the command of Captain Gérard, who was also the inventor of a collapsible bicycle, which has been reproduced in Germany.

During the divisional manœuvres, the company found a wide field of utility, in occupying important points in advance, or on one side of the main road of operation, in keeping defiles open, in securing the flanks, etc.; and all reports were unanimous in the opinion that it rendered important services to the troops it was attached to in securing favorable conditions in which to fight. This, from the tactical point of view, is of great importance.

That, in covering long distances, the cyclists can act more rapidly than the best cavalry, is noticeable, because cases can be imagined in which cyclist companies in front of their own cavalry may be of great tactical service, if utilized skilfully.

Once it had been proved in France that cyclists, with appropriate organization, training, and leading, could be of value in certain cases as fighting troops, infantry gained a new means towards its tactical independence, because security, reconnaissance, and the imparting of orders are combined with the fighting objectives; and now outside the framework of the ordered battle, definite tasks can, in some circumstances, be successfully carried out by infantry without the assistance of cavalry.

Once the matter has been set going, no military administration can hesitate longer to promote it energetically. Of course, in doing so, exaggeration must be avoided, for the best organized cyclist formations will never be in a position to take the place of good cavalry; but both infantry tactics, as well as those of cavalry, will very soon have to reckon with this new body of troops. There seems no doubt that minor tactics will in future be materially influenced by them.

In France it was proposed to form, provisionally, 25 *compagnies cyclistes militaires* one for each army corps and each permanent cavalry division, which would in the event of war produce about 6000 combatant cyclists. The more solidly such formations can be organized in peace, the greater will be their tactical employment in war; for attention must be directed again and again to the fact that looking to the competition now prevailing in all military matters, in everything that affects tactical efficiency, the peace organization, both as a whole and in detail, must prepare this effectively beforehand.

In Belgium, also, the military cycle service is already organized. There used to be a school of *Vélocipédie* attached to the carbineer regiment, but it has now been broken up. In its place, one cyclist company has been formed in each of the four battalions of this regiment. According to official instructions these companies are not only intended to form a certain number of orderlies for the field troops, but also are to coöperate with the cavalry in reconnaissance work, and form a support

to them on occasion. Here also, then, we see a mounted infantry, which apparently has a future.

ALTERATIONS IN THE FIELD-SERVICE REGULATIONS IN
AUSTRIA-HUNGARY.

During the past year a new and in part revised edition of the second part of the service regulations has been brought out, relating to duties in the field. The alterations are not for the most part material; but there is a new paragraph relating to outposts that appears disputable. It runs thus:—"The outposts must take up such a position that all the lines of approach open to the enemy which lead to the cantonments or camps of the troops and trains are covered in so far as the independent security by individual groups of the main body of the troops in these directions does not suffice."

In certain circumstances this may lead to an excessive expenditure of measures of security, and, at least, for the infantry this must be protested against, because a scattering of the forces will thus be inevitable, apart from it being a useless expenditure of power. Both can only reduce the tactical readiness of the infantry to fight, and if in many of the peace outpost exercises the mechanical element prevails in the form of an endeavor to produce a prettily formed line of outposts which is to cover everything, this is done at the cost of the tactical element, and is hardly suited to service conditions. The infantry of the outposts must always be ready to fight, and consequently it must be concentrated. It is therefore, much sounder to ask how weak the outposts can be than how strong they can be, when considering the provision of infantry for the advanced outpost line.

The German *Felddienst-Ordnung* supports this view by the following paragraph:—

"By day, and still more by night, the movement of troops, when not actually engaged, is restricted practically to the roads. It is, therefore, of advantage to occupy those roads that lead from the enemy. Once we have taken possession of these, the more considerable undertakings of the enemy cannot escape us, smaller movements near the roads will disturb the outposts, but they will not endanger the main body."

It is not, therefore, necessary to occupy every field road leading in the direction of the enemy with infantry or even with fixed cavalry posts. Very few outpost companies then, but in their place by day many cyclists, and by night so-called "Cossack posts" towards the enemy, so that the infantry may be able to economize its forces, for it is in the field to fight and only exceptionally for purposes of security.

NEW INFANTRY DRILL, REGULATIONS IN RUSSIA.

After diverse and partly very lively discussions in the military press, in which officers of all ranks participated with great freedom, provisional draft regulations have been framed, which are to be practically tested

during the present summer by the 1st Infantry Division in camp at Smolensk.

They are characterized by the number of drill exercises being materially cut down, the formations in column restricted, looser, more handy formations favored, and the entire fighting mechanism of a battalion simplified by its fundamental division in two parts (after the French pattern), the fighting line and the reserve. All these modifications are demanded by modern tactics, and only in one point do the Russian provisional regulations depart materially from their requirements, and in this a kind of national tactics seem to have taken their place; this is in the manner in which superiority of fire is to be obtained. There will be an opportunity of returning to this point in the following sketch of the mode of attack of an infantry regiment as prescribed by the draft, for, in testing it practically, the infantry of the 1st Infantry Division was formed mostly as one regiment on war strength, so as to obtain the nearest approximation possible to service conditions.

As soon as the enemy's position was recognized, the regiment deployed at a long distance, so as not to offer a favorable target to the hostile artillery, and commenced its advance. The development of the skirmisher line took place generally so far as from 2000 to 1800 metres of the enemy, and was formed by two complete companies per battalion. The preference is given to this system from the following considerations of a psychological nature: firstly, because the company reserve after exposure to fire is not fitted to afford efficient support to the skirmisher line; secondly, because the energy and watchfulness of the company commander is divided; thirdly, because it is most desirable that from the outset at least half the number of rifles available should be brought to bear (formerly 25 per cent. was the proportion provided, whereas now it is 50 per cent.); and fourthly, because the battalion commander has for the time two companies in hand, whereas by the system of *petits paquets* he could, perhaps, dispose of one intact company, though generally he had only the supports left, which were really no good to him, for they were under the company commander in front.

The one really valid objection to the system of the whole of a company being extended, seems to be that in the further course of the engagement it will be impossible to avoid different companies becoming mixed up. The experiences of military history show, however, that in a pitched battle this cannot be prevented (it happened even at the battle of Mollwitz), and it should besides be a matter of indifference to well-trained troops whether men of a battalion or of a regiment have to fight mixed up together; and so long as the principle is maintained of entire regiments fighting side by side, the case of the men of different regiments being mixed should be of rare occurrence. It is not possible to prevent order being lost, and these mixed-up bodies are regarded by many superior officers as disordered crowds; but there is no doubt that organized disorder, so far as it can be practiced in peace, is, after all,

better than disorganized order. For order, in the mechanical sense of peace habitude, cannot be maintained in war; and, unless organized disorder is practised during peace, there will in war be no other alternative but tactical disorganization.

The forward movement of the rearward lines was conducted in line; preferably, though, in formations with small heads (file formations). The whole—skirmisher line and reserve lines—moved at a walk. The double is only to be resorted to exceptionally, to cross very exposed ground. The advance by rushes is neglected as a rule, for from the first fire station, at a distance from about 1200 metres, to the last fire station, at about 500 to 450 metres from the enemy, the advance of the skirmisher line is continuous at a walk. In the meantime, the rearward lines have diminished their distances, deployed from narrow formations into broad ones, and approached to a distance of 150 metres to 100 metres from the line in front of them. The enemy is stormed from the last fire position, with an accompaniment of magazine fire, and at 50 metres from the enemy the men cheer. In principle, the so-called "penetrating attack" is used here; that is, the whole of the lines of both parties must pass over each other. These "penetrating attacks" are a speciality of the Russian army—they are practised also between cavalry and infantry; their object is to obtain the energy of the assault, even in peace. The tendency in itself can be understood; but a cool opponent, who knows how to use his rifle, would give little opportunity to an infantry that expected decisive results from a "penetrating attack."

It is only the draft of the new regulations that has been dealt with, and the issue of these in their ultimate form must be awaited before a final judgment can be made. But in the meantime it is of great interest to recognize in the draft the main lines on which tactical thought in military circles is moving in Russia. This knowledge is supported by reading the various articles written from different points of view sometimes, in the *Voïennii Sbornik*, all of which are occupied with the method of attack. The impression observable in them is that the Russian infantry should look for their salvation to the bayonet, and it seems often as if the rifle were regarded as a kind of useless evil; whereas at the present day tactics must really be based on the rifle, and not on the bayonet.

If, then, doubts must arise regarding many important questions in the tactical procedure which seems to be in course of creation in Russia, on the other hand, the appreciation of modern requirements appears to have been given its just value in the tactical formations and organization.

THE ACTION OF THE COMBINED ARMS.

This subject can only be discussed from the point of view of service conditions if the framework of battle be adhered to. The tactics of detachments have no place here; they belong rather to the category "Kleiner Krieg," and not to that of the tactics of the three arms.

Further, the service of strategical reconnaissance, even assuming artillery and infantry to coöperate, is exclusively a matter of higher tactics of cavalry, for its capability of action and fighting power are sufficient here.

In protecting the march and in outpost duties the main point is always the appropriate employment of the cavalry, particularly now that by its capability of fighting on foot, and by its future combination with cyclist companies, cavalry possesses a high degree of tactical independence. At present it cannot be foreseen whether the further development of the military cycle service will increase the independence of the cavalry more than that of the infantry.

On the other hand, it must be concluded that in actual battle tactics, the action of cavalry will be relegated more and more into the background. Neither peace representations nor the efforts of the cavalry itself only to abandon step by step the ground on which its action was in part decisive, can alter much in this irresistible development. But there still remains plenty of scope for an enterprising cavalry, apart from the services of information and security, in fighting the enemy's cavalry, and—theoretically, at least—in the pursuit of a defeated enemy. Military history has, in any case, had little to record during the last 50 years of this last kind of operation.

Infantry and artillery have gained the more in their powers of destruction, and in this lies the fundamental element of all military action in war. Since, however, cavalry is constrained by the force of circumstances to employ its firearm more and more, it renounces in a certain sense its independent tactics, for when fighting on foot it must employ infantry tactics. Its tactics are, therefore, now of a mixed nature, according as it fights mounted or on foot; whereas infantry and artillery have only one method of fighting. To this must be added that infantry has become more and more a distant arm—for infantry fire is now employed at distances formerly reserved for the artillery—and consequently it has got to have still more points in common with the artillery.

From these considerations the conclusion may be drawn that the tactics of the combined arms are still in a state of transition, and that it is not proposed to speak here *ex cathedra*. This applies especially to higher tactics, and this view is also taken in general in Lieutenant-General Freiherr von der Goltz's valuable work "*Kriegführung*."

Besides von der Goltz's studies, it is of interest to know the views of General Lewal, who, going beyond the usual programme of tactical considerations, discusses thoroughly night operations and battles of several days' duration. He holds the view that, in future, both will play a much greater rôle than is usually attributed to them. By night operations on a large scale, he means chiefly the moving up and placing in readiness of large masses of troops during the night, so as to attack at dawn. "The whole question is of great importance; the effect of fire nowadays is constantly increasing; in some cases it may be so great an obstacle,

as to be only surmounted by darkness. Operating, therefore, by night cannot at times be avoided, and such operations must become more frequent the greater the progress made with the perfection of firearms."

The General wishes, therefore, to include such operations on a large scale in the peace training, and as regards the artillery he refers to the following paragraph of the German field artillery regulations: "The difficulty of unlimbering in open ground under the enemy's fire may lead to darkness being utilized. In this case the border of the enemy's fire zone is approached the previous day, and the batteries are taken up, under cover of night, to the position chosen and if possible prepared in order to begin the engagement at daybreak."

A similar procedure is advocated for the infantry, in which cases surprise and a determined advance must answer best. It may be observed that in Germany experiments have been made with cavalry masses operating by night by surprise, and that in Russia attempts have been made to reduce night operations to certain formulæ. In such undertakings mass tactics are especially recommended, which in operations by day are a thing of the past.

As regards the battles of several days' duration, they are difficult to separate from position warfare. Here also the usual methods of employment of the three arms would have in fact to find their way into new channels. The General says quite justly: "The battle of the future will then assume certain characteristics of fortress warfare and endeavors will be made to increase the destructive powers of artillery. Work must be done during the night, but without over-exerting the men, for they must be held ready to resume the fight as soon as day breaks."

Should war be really of this nature in the future—and the probability of it being the case is increased from the fact that modern armies occupy much less time to seek one another out and more time in fighting—the action of field artillery in combination with heavy batteries will become almost decisive, and the infantry will frequently have to adapt its action to that of the artillery in place of the reserve, which is the present arrangement.

The question of the degree of independence of leaders has a certain connection with that of the united and simultaneous coöperation of the forces in action. It appears to be in the nature of things that there is great danger in the one-sided accentuation of independence, especially when the three arms are engaged. If a cavalry leader under the formula of "independent" under all circumstances—and for the cavalry undoubtedly this qualification is of the utmost importance—were to undertake an independent cavalry action, without carefully weighing the small chances of success for his arm against artillery and infantry, such as was attempted, for example, on the 18th August, 1870, on the right flank of the German line of battle, such an excess in the employment of cavalry outside the general framework of battle, would have exactly the same failure as then.

The independence, therefore, in a battle of the several arms is very restricted; they are there much more dependent on one another than becomes apparent in peace exercises. This applies equally to the artillery, which is not so independent of infantry support as is often represented. The 18th August, 1870, is also an example of this, which is well worth attention, so far as regards the independent action of the artillery of the 9th Army Corps; and in further reference to this battle, the premature engagement of the Prussian Guards may be cited, premature as regards its connection with the general tactical situation. The intention was to carry through an independent infantry action without sufficient previous tactical use of the artillery.

It was pointed out in 1894 that a strong feeling was arising against the employment of large advanced guards, on the ground that their rôle was rather to observe and reconnoitre than to fight; and that with strong advanced guards composed of all arms, there was the danger they may become engaged in independent actions that will prejudice the unity of the operations of the whole. It is suggested, therefore, that advanced guards should be weak in infantry, have no artillery at all, and be strong in cavalry, and eventually provided with cyclist companies.

Apparently the composition of advanced guards is a point in which modern teaching is inclined to depart from the principle of a mixture of the arms as a basis. It seems evident that looking to its actual arms and training, cavalry can in some circumstances dispense even with infantry in the duties of advanced guards, especially if they should be furnished with cyclist companies. The advocates of strong advanced guards point out that they have to cover the deployment of the main body, and must consequently have a certain fighting power, including artillery. If this were strictly so, there would be much in their favor, but experience has shown that the main body is easily led into directing its deployment so as to meet the fighting requirements of the engaged advanced guard. It is then all over with a united deployment and the employment of the entire force with a great object in view.

It is argued on the other hand, that the deployment of the main body, by which must be understood the mass of infantry, must before everything be covered by the artillery. But where can the artillery take up its position, if the advanced guard is already engaged in front of it? It would be obliged to take up its first position in the line occupied by the advanced guard, and it must be doubted whether this would be of advantage for the later formation of the main fighting front. If, however, no regard had to be paid to the action of the advanced guard, the first placing of the artillery could be carried out compactly and smoothly within the framework of the whole.

There are no differences in the opinion that the introduction of the artillery combat consists from the outset in tactical dispositions that will insure concentration of fire, and the independent fighting power of the

artillery is frequently held not to require an immediate protection by the other arms. Especially in those armies in which the artillerymen are equipped with a rifle, it is maintained that infantry support is only required in the later stages of the action, when the enemy's infantry masses advance to the attack.

Similar unanimity almost exists that, in general, artillery will open fire at a range of about 2500 metres, and at first will direct the whole of its efforts to overpowering the enemy's artillery; also that the whole battle tactics of artillery must never be a thing for itself, but it should always keep in view its main object, which is to prepare the way for the decisive attack of the infantry. Thanks to its numerical, technical, and ballistical superiority, this programme was in most cases carried out by the German artillery in the Franco-German War. It did not succeed before Plevna. Looking to the present high standard of capacity of all artillery, it is open to doubt whether it will be possible to carry it out in future with similar precision.

The infantry attack is undoubtedly the most difficult of all tactical problems. It seems indeed to many incapable of solution, if the infantry attack has to be carried through under artillery fire, and during a long space, for it begins to tell at 2500 metres, and becomes more and more effective up to from 1200 to 1000 metres, without any protection from it being available. This is a long and bloody way, which was formerly unknown. The attempt is made to make the solution of the problem easier by simply eliminating the fire of the artillery as the disturbing element of the equation. The hostile artillery is overpowered, and then the infantry attack has only to deal with hostile infantry fire. But if we do not succeed in silencing the enemy's artillery? The attacker cannot still withhold the infantry attack; it must be engaged and carried out. The attacker may even fall into the position of having to let his infantry go, in order to avoid the reverse proposition of his own artillery being overpowered by that of the enemy, or of abandoning the infantry engagement as purposeless.

These are no idle questions, but in books on tactics, as well as in the regulations, the precise answer is faulty, for everywhere the sentence is: "The artillery crushes the hostile artillery, it then directs its fire upon the infantry, which it regards henceforth as its chief target." The same tactical axiom is applicable to the artillery of the defenders. On close examination, however, it will appear that however applicable theoretically these tactical requirements may be, as regards the artillery, in the opinion of the writer a system of battle tactics cannot be based on it, because the main factor, the overpowering of the artillery, is so uncertain.

It must be considered whether a return should not be made to the old tactical practice, and, without prejudice to respect for the increased importance of artillery, to make the main tactical event of the battle—the advance of the infantry—more independent of the coöperation of

artillery ; while at the same time shaping the tactical procedure of the principal arm, so as finally to promise success in spite of the defender's artillery fire. The old tactics had also to count in the infantry attack with the enemy's case fire, which had been invented with the sole object of being used against infantry. This case fire had to be surmounted up to the closest distances, and no one thought the infantry could not succeed because it had to advance under this fire. The analogy speaks for itself. Only the procedure must not be based on the advance of columns of assault, but on suitably arranged swarms of skirmishers ; in any case, such a system of tactics would have the advantage of not having to stand or fall according to the constantly uncertain success of the artillery duel.

We may think over these questions as much as we like ; the fact remains that under all circumstances nowadays the artillery line forms the outline of the fighting front—the skeleton of the battle. The necessity then arises, if only from this fact, for every tactician—and this term includes every superior officer—being thoroughly instructed in regard to the procedure in battle, and the ballistic capabilities of artillery. This will better promote the proper appreciation of the working together of the several arms than many axioms, that appear only to exist for the purpose of preventing unprejudiced consideration.

Naturally, the infantry must see to the security of the artillery from hostile infantry fire in the later stages of the engagement. According to General Rohne, a line of skirmishers pushed forward to about 400 to 500 metres in front of the batteries will be sufficient.

Opinions differ as to whether the artillery of the attacker should take up one position only, not too far from the enemy, or change from one to another. There is unanimity of opinion that the artillery of an infantry that is advancing victoriously should second its efforts by advancing rapidly and energetically from one position to another.

The tactical conduct of the defense is incomparably simpler, both as regards the artillery and the infantry. Here there is in the main only one position ; and the defense is, even without great advantages of ground, so favorably situated both technically and ballistically, that it can do with the simplest tactical means in the main fighting front. Here all the measures taken cannot be sufficiently simple. For a normal defense, the principle is applicable that the available artillery should come into action from the outset, but only to engage the infantry when hostile infantry is in sight. It seems to stand to reason that strong reserves should be formed separately by the defender, and that his cavalry will be on the flanks. It is equally a matter of reason that the defender should never be passive, but always have in view a counter-offensive.

There can be no doubt that the defense has increased in power, and it may happen perhaps in the future that a commander, not led away by the international doctrine of the unqualified benefit of the tactical offensive, may know how to reap the tactical advantages of this fact.

He would then occupy his front comparatively weakly while skilfully preparing it, and when the enemy had suffered in frontal attacks, would advance with snperior forces from a flank before the attacker's turning movements have become effective. It is undoubtedly a problem of the first rank, but its solution must not be declared impossible because the tactical tendency of the present day favors the offensive. These are good grounds only for the strategical offensive; there are some good grounds for the tactical offensive, but they are not sufficiently conclusive to allow of the advantages of a skilful tactical defensive being relegated into the background, because this is nowadays good tactical style.

The justness of the tactical principle generally laid down, that the defender should be placed with a narrow front, or as far as possible, massed, may be doubted, on the grounds that the defender must avoid a deep formation, and must on the contrary occupy as wide a front as practicable, so as to make a turning movement by the attacker difficult. It appears to be sound, that a defender disposed in depth will be easier to turn than if he occupied an extended front. And if the defender in deep formation once falls under concentrated fire, his deployment will come too late.

It remains to consider the task that falls to cavalry tactically in the battle. The books of instruction say that it watches the suitable moment to act, not only on the flanks, but the so-called divisional cavalry even in the midst of the actual line of battle.

As regards the execution of these instructions, this, in the opinion of many tacticians, will become more and more difficult. Here and there it is taught that cavalry should be freed altogether from intervention in the artillery and infantry engagements. What is thought is, that the tactical rôle allotted to cavalry can, from the nature of modern fighting, be only carried out in exceptional cases; but that a well-led cavalry will be able to take its place in war, even though unable to fulfil the expectations formed of it in regard to battle tactics.

CAVALRY TACTICS.

Now that the Russian cavalry have received new regulations, the cavalries of the Great Powers of Europe have once more become as similar in regard to tactical formations as it is possible to make them. Were it not that the distribution of regiments into squadrons (4 and 6) is different, an almost complete agreement would be reached.

The judgments also regarding the arm on the battle-field and its employment in masses are in agreement, only apparently Germany cannot decide to give effect to them by the organization of permanent cavalry divisions in peace, as has long become a habitude in other places.

At the annual exercises battle tactics continue to play the principal rôle in all countries; the necessity for maintaining this cannot be gainsaid. But it appears only the more, time to give its due to the services

of information on a large scale. This is particularly the case in Germany, for her opponents have always been equal on the battle-field, so that superiority must be sought in other directions. In this the hitherto somewhat neglected question of screening will be gone into more closely, and hand and hand with it system imparted into forwarding back reports.

The employment of cyclists with cavalry continues to make progress.

The question of armament has not entered a new stage. The German cavalry have not given up the lance, whereas France and Russia hold on to the sword. In France opinions still differ. They do not like the German lance, and would like to do something to meet it; but are doubtful as to the possibility of placing this arm in the hands of all the French cavalry. To enable this to be done heavier recruits would have to be got for the cavalry, which would necessitate again their being mounted on heavier horses.

The new German cavalry regulations of the 16th September, 1895, have gone through their first drill year. The troops have been able to test them during a drill period and during the autumn exercises, and this test has gone off well.

The new Russian cavalry regulations show progress in every branch of training. The wish urged in former years in the press to restore to the Cossacks their national mode of fighting has not been regarded in the regulations, which may be taken as definitely settling the question. The *lázva* is left to them, but they must ride in close order; and firing in the *lázva*, as understood by the Cossack swarms, is not provided for. The conclusion has then apparently been drawn from the experiences of latter years, that only a regular cavalry is of importance on the battle-fields of Central Europe, and also that the Cossacks can keep pace with the training of the line.

FIELD ARTILLERY TACTICS.

The previous year's report commenced with the remark that there were, in the main, three questions, which for some years past had been under discussion. The first referred to the organic separation of a corps artillery, or the distribution of the whole of the artillery amongst the infantry divisions. This question has not been advanced in any way during the past year. It is referred to now only to correct a printer's error. In the previous report the sentence ran:—"The grounds for it" (viz., for the distribution of the whole of the artillery to the infantry divisions) "are not apparent." Whereas it should have been "New . . . grounds are not apparent." As is evident from the previous report referred to, the writer is an advocate for the distribution of all the artillery amongst the infantry divisions.

In the question regarding the future armament of the field artillery, which now as then occupies most interest, views have become more

clear. It may remain undecided whether the circumstance that Russia has come to a decision on this important question, by electing for the increased effect of the single shot, has been of decisive importance. It is a fact, that the predilection for the light but quick-firing gun has retrograded still further; and that, so far as the press has rightly gauged opinions, the gun with greater effect from its single shot is preferred. Even in France, whence the inspiration came for the small calibre quick-firing gun, a complete change of view has taken place. In the periodicals warning is given against precipitation, and the more powerful gun advocated; indeed, frequently the opposite fault is noticeable, and guns demanded that will fire much heavier projectiles than those now in use.

The writer continues to hold the opinion that in the present state of technical knowledge, the gun of the future should have a calibre of from 7.7 to 8 centimetres, and a shot of 7 kilogrammes, with an initial velocity of about 500 metres. The shrapnel should have the chamber in the base, and contain from 280 to 300 bullets. Such a gun would insure a materially greater effect for the single shot than the existing gun, besides having increased mobility, and especially rapidity of fire.

The course taken during the past five years in the question of the field-gun of the future, shows how necessary it is that the artilleryman who would come to a decision on the point, should not only be a tactician, but also versed in ballistics, otherwise he may very easily get astray.

In close connection with the question of the future armament of the field artillery, is that of the future organization of this arm, especially as regards the strength and composition of the batteries, which has been actively discussed during the past year. Starting with the assumption that the effect of the new field-gun will be at best as great as the existing gun, and very probably superior to it, and that the rate of firing with the single gun will be about twice as great, the question was discussed in the *Militär-Wochenblatt*, what should be the strength of batteries on the introduction of such a gun, in order to employ its inherent qualities to the best advantage. (*Militär-Wochenblatt*, No. 13, 1896. "Ought the field batteries in the future to be formed of six or four guns?") It was pointed out that a battery composed of four quick-firing guns would produce the same effect in battery fire as a battery of six guns; for in battery fire, which is, and will continue to be, the rule for the artillery action, the six-gun battery cannot fire more rapidly than the battery of four guns. The reduction, however, of the number of guns from six to four would have many advantages: shortening of the columns of march, diminution of breadth of front of the fire line, easier control of fire, and better training of the war batteries, from which it is inferred that the war battery of four guns would have even a greater effect than one of six guns, under the condition of course that battery fire is employed. With magazine fire the battery of six guns will naturally have the greater effect; but with the ranges ordinarily employed, there can be no question of this, for the control of fire would get quite out of hand. As

a disadvantage of the smaller strength, it was pointed out that losses would be felt more. With the same intervals between guns, the smaller battery, in similar conditions, will suffer fewer casualties than the larger one; but proportionately the losses, and with them the loss of fighting power will be greater.

The still burning question of the bombardment by the artillery of objectives situated under cover was much discussed during the past year. The *Revue d'Artillerie*, in an article styled "État actuel de l'armement des artilleries de campagne étrangères en pièce à tir courbe et obus brisants," summarized the actual situation as follows:

1. A field howitzer or mortar has been introduced in France and Russia, and is under trial in England, Italy, Spain, Bulgaria, Turkey, and the United States of America. In Germany, Austria, Belgium, and Switzerland, it is intended to employ heavy guns belonging to the siege artillery for the purposes of the field army.

2. A high-explosive shell with thick walls and comparatively weak charge and time fuse has been introduced in Germany and Austria.

3. A high-explosive shell with thin walls and the heaviest charge practicable, with percussion fuse only, in France.

MACHINE GUNS AS AN ADJUNCT TO CAVALRY.

Translated from the Revue d'Artillerie.

BY CAPTAIN JAMES PARKER, 4TH U. S. CAVALRY.

COLONEL VON STIPSICZ, of the Austrian artillery, in an article in the *Organ der Militär Wissenschaftlichen Vereine* after detailing the peculiar functions of cavalry and in particular its weakness when on the defensive, calls attention to the necessity hitherto experienced of supporting with infantry and artillery operations undertaken independently by large bodies of cavalry.

According to Col. Stipsicz, what the cavalry most needs is a fire action which will not interfere with its mobility. Now since infantry, on account of its slowness, is powerless to afford a constant support to cavalry in offensive or forward operations, it would be highly advantageous were the cavalry provided with a light rapid-firing arm which could be quickly brought into use on the field of battle, and the effect of which would, in a measure, supply the place of infantry fire.

The arm which Col. Stipsicz extols in this connection is the machine gun (Mitrailleuse).

"On the defensive it can do almost all the work we would require of infantry. And further, this arm is able to take part in all fights of cavalry without impeding its mobility."

Nevertheless, it is evident that the best rapid-fire gun can never wholly supply the place of infantry. But that is not the question.

What we want is to furnish simply a substitute for the infantry while awaiting its arrival on the field of battle.

Various experiments in this direction have been made in several European armies. So we read in the *Revista di Artiglieria e Genio* of April 1895: "It is proposed in England to provide cavalry troops with Maxim guns, as is being done in the Swiss army. For the time being, however, no steps are being taken beyond commencing the instruction of the troops in the use of the arm and in its advantages."

The Russian *Artillery Journal* (1896) announces that similar experiments are being made in Russia, with rapid firing guns attached to cavalry commands.

The reason why the attempt to utilize rapid-fire guns in the great armies of Europe has been suspended for a number of years, in the belief that their use on the field of battle must be abandoned, are as follows:

1. The unfortunate experience of the French army in 1870-71 with these weapons left grave apprehensions as to their value. It should be remembered, too, that the force of Italian troops commanded by Lt. Col. Christofuis, which was destroyed at Sati in 1887, possessed two machine guns, which could not be used owing to the fact that their interior mechanisms were clogged with dust.

2. Not only was the volume of fire of the old style machine guns unsatisfactory, but, in addition, these weapons were so heavy that they were harder to haul than the ordinary field-guns.

3. The intricacy of the mechanism of these weapons was so great that they were continually getting out of order.

As a result of the great progress that has been made of late years in the improvement of powders and machinery, it is in the opinion of Col. Stipsicz hardly possibly that these objections can have much weight, these machines having been so improved as to be now not only simple, but light in weight and formidable.

Thus, little by little, the different nations have again commenced to take into consideration the advisability of employing machine guns as a useful adjunct to cavalry.

In what way may we best secure the means of conveyance to the field of battle of these new weapons as well as their proper employment there?

Colonel Stipsicz believes that they should be put on wheels, not on pack-saddles. In fact these guns are so light and can be transported on such a light gun carriage, that he thinks one horse ought to be able without difficulty to haul a machine gun over any obstacles a cavalry command is liable to encounter.

Besides, a machine gun on wheels can carry with it a quantity of ammunition sufficient for the first few rounds; and further, can go at once into battery, advantages not to be obtained when the gun is carried on a pack animal.

As to the personnel of the gunners, etc., they should be mounted, as in horse batteries.

Such a weapon is therefore preëminently a mobile arm, and should be capable of following cavalry in all its movements and at all gaits.

It would be well to carry on the carriage a light arrangement, like a sort of second little gun carriage, on which the gun could be mounted when it is not possible to train it in the ordinary way—as might occur, for example, when the available level ground is very narrow and is surrounded by abrupt slopes; when in houses, etc.

As to the question, what should be our combat-unit for machine guns? Colonel Stipsicz recommends that they be grouped in batteries of four guns, under the command of an officer of artillery. "In fact, by its very nature the machine gun belongs to the artillery. Its proper employment ought to be much better secured when under the orders of an artillery officer than under a cavalry lieutenant, and four of these pieces under a single command would make up a fighting force that could not be despised."

In the cavalry division it would seem that such batteries should not be attached to regiments or brigades, but be directly under the orders of the general commanding the division, in the same manner and for the same reason as horse batteries. Machine-gun batteries, in fact, form fighting units too feeble to be altogether independent, as much on account of their administration as their mobilization. If to keep them up or complete them horses or men are needed, it is necessary that the artillery organizations should be applied to. For these various reasons, as well as on account of the nature of their technical instruction, it would seem reasonable to consider them as part of the artillery, not the cavalry.

The fact that these batteries will be under the direct command of the division commander will evidently not prevent them from being temporarily attached to brigades or regiments, according as emergencies may render necessary.

As to the number of machine-gun batteries to be assigned to each cavalry division, it would seem to Colonel Stipsicz that one would suffice, at least for the present. If it should turn out that the good results we have reason to expect are attained, the cavalry arm will not hesitate to ask that new batteries be raised. In any case, as in all experiments, it is well to be on the safe side.

But how are we expected to use batteries of machine guns?

Since they can be considered only as a makeshift to temporarily and partially fill the place of the absent infantry, while awaiting its arrival on the field of battle, it is logical and proper that the machine guns should be entrusted with the rôle which undoubtedly belongs to that infantry—a rôle which, first of all, is defensive. In fact, since the improvements in firearms aid the defense, particularly machine guns, which are very justly styled condensed infantry, seem to be called upon to play a rôle which is very efficacious, but only as far as it is a means of increasing the defensive power of the cavalry.

The same advantages, however, cannot be claimed for the use of

machine guns in the offensive. To win with their resources alone, an offensive fight, is as impossible to machine guns as to any other sort of artillery. To win such a fight is the business of the other arms, and Colonel Stipsicz insists that no matter how much the machine gun may be improved, cavalry fighting offensively will never be able to do without infantry. Yet these machine-gun batteries will have the inestimable advantage of furnishing in cavalry fights the aid of a violent fire, analogous to musketry fire. Now when we remember the development of the cavalry in the armies of certain European nations,* mounted troops will have, in machine guns, a precious aid, of which it would be imprudent to be deprived.

As for the proper employment of machine-gun batteries, it should be very much the same thing, except as to conditions of range, as that of horse batteries. Their advantage will be accentuated in difficult country, soft ground, wooded or marshy lands scarcely practicable for horse artillery. It may even happen that in these cases the presence of a single battery of machine guns may enable the general to keep with him both of his horse batteries; when now, under present conditions he is often obliged to send off one and sometimes to be separated for a time from both, thus being deprived for a time of a very important element of his fighting force.

Other cases will present themselves to the reader in which the division commander has to give up one or two of his batteries. In the artillery duel which precedes the battle, for instance, in such cases the help of the machine guns would be most useful.

It must not be understood, however, that the machine gun can ever take the place of the field-gun, as far as the cavalry is concerned. It is powerless to overthrow obstacles, to knock down the field works occupied by the enemy, to pursue routed cavalry with a violent fire, or to defend victoriously a conquered position (?). In fine, the field-gun remains indispensable to the cavalry as much in the strategic rôle as in combat.

To sum up, the conclusions of Colonel Stipsicz are as follows :

Machine guns cannot as far as cavalry is concerned, take the place of horse batteries, nor of infantry.

It is not to be denied, however, that machine-gun batteries will be, first, available for supplying, in a certain manner, the absence of the infantry while awaiting its arrival on the field; second, that the machine guns will favorably and usefully complete the work of the horse batteries. Such machine-gun batteries should then be, in the hands of division commanders of cavalry, if not a sure element of success, at least a precious aid.

* This evidently refers to the fire action taught in the Russian cavalry.

Military Notes.

THE BALLISTIC QUALITIES OF SMOKELESS POWDER.

IN the course of an illustrated and exhaustive article on some new features in smokeless powders and their ballistic results, Mr. Hudson Maxim in a recent issue of *The Engineer* observes :

"Maxim-Schupphaus smokeless powder consists either of pure gun-cotton or of a compound of 90 per cent. mixed gun-cottons, 9 per cent. nitro-glycerine, and 1 per cent. urea. This percentage of nitro-glycerine we believe to be a decided advantage, and, as has been demonstrated, such a small quantity imparts to the powder none of the disadvantages common to high percentage nitro-glycerine compounds. A powder made according to this formula is a very dense hard and structureless colloid ; and if the nitro-glycerine were to be wholly eliminated from this compound, the gun-cottons alone would not contain oxygen enough, and the compound would not burn under the same pressure with equal rapidity, and there would be a falling-off in the ballistics. When so little as 9 per cent. of nitro-glycerine is used, the quantity employed in the Maxim-Schupphaus powder, nothing but a chemical analysis can detect its presence. It cannot be pressed out, and not a particle of it can be volatilized in a vacuum ; while, with cordite containing 58 per cent. of nitro-glycerine, it is easy to distil off nitro-glycerine and condense it in a free state.

"The nitro-glycerine may be entirely dispensed with, and a pure gun-cotton composition be manufactured after essentially the same method. In this case we prefer to use about eighty parts tri-nitro-cellulose, and nineteen and one-half parts gelatine-pyroxilin, and half of one per cent. urea. Owing to the absence of nitro-glycerine, which facilitates the mouldering operation, slightly more solvent is left in the material before pressing. As I have said, it is impossible to evaporate the last trace of solvent from the compound, but, as the quantity remains forever constant, and never escapes, it does no harm.

"We placed 100 lbs. of this powder in a room heated to a temperature of 125 deg. Fahr. for two weeks, without showing the least loss of weight. Some of this powder was then pulverized and exposed to the same temperature, when the remaining solvent was driven off. Whatever theories and preconceived opinions may be, the true test of a cannon powder is the test of time and exposure under service conditions.

"At the Sandy Hook Proving Grounds, in the United States, a quantity of this powder was thrown loose upon the floor in an open room,

and there exposed for a period of three years to the heat of summer and the cold of winter. At the same time an equal quantity was filled into cartridges and kept sealed up for an equal period. Some of the loose powder was then filled into cartridges and fired side by side in alternating shots with that which had been kept sealed, with the result that the ballistics of that which had been exposed and that which had been sealed up were identical, proving that the powder had undergone no change whatever.

"These powders can be produced on a large scale speedily economically; and as the experience of years has proved, they can be produced of uniform composition. The machinery, tools, and processes have all proven practicable and workable commercially, and, I may say, to ideal perfection.

"In view of the peculiar treatment to which our powder is subjected in the process of manufacture, we prefer to add a small quantity of urea. The peculiar influence of urea is well illustrated by its use in the manufacture of transparent celluloid, such as photographic films, which, in case they are cut from a block of compressed material, and not made by flowing a comparatively thin solution on glass plates, or by an equivalent method, could not be produced without the use of this substance, as the temperature to which it is necessary to subject the material causes such slight decomposition as to discolor the product. Urea counteracts this by neutralizing the nitrous acid as fast as formed.

"Urea has the further advantage above any other neutralizing substance, in that it is decomposed by nitrous acid into carbonic acid gas, water, and nitrogen, leaving no solid product in the material, while it is not an active alkali, and its presence has no effect whatever upon the nitro-compounds with which it is combined. The high excellence of the Maxim-Schupphaus smokeless powders is well evidenced by the fact that they are now being manufactured and furnished to the United States Government by the world-renowned firm of E. I. Dupont de Nemours and Co., of Wilmington, Delaware, who have acquired the American patent rights.

"In view of the late Maxim-Nordenfelt suit versus Anderson and the British Government, and the questions involved, it may be well to mention here that the inventions and patents of Dr. Robert C. Schupphaus and myself, employed in the manufacture of the Maxim-Schupphaus smokeless powder, have no connection with those of Mr. Hiram S. Maxim, and nothing whatever in common with, and do not resemble, those of either party to the suit in any of the particulars involved in the action, either patented or patentable.

"In the Maxim-Schupphaus smokeless powder no oil of any kind or mineral jelly is employed as a moderant or deterrent to slow the action of combustion or explosion, for the reason that we have found colloids of gun-cotton burn much too slowly, and through too small a thickness of material in large guns, under service conditions, even with no

moderant, to yield a sufficient quantity of gases to produce requisite velocities, without such fine granulation as to expose so large an amount of initial burning area as to exceed permissible pressures, thereby preventing the use of full charges. For this reason no pure gun-cotton powder, or one containing a low percentage of nitro-glycerine, has yet been produced which has been successful in guns of more than from 4 in. to 5 in. calibre. This is true even with powders containing as high as 35 per cent. of nitro-glycerine. They do not burn fast enough, as I have said, even without oils or moderants, unless the grains are multi-perforated. Of course, a 35 per cent. compound can be used in a larger gun without being perforated than a compound containing no nitro-glycerine, but for 10-inch and 12-inch guns as high as 50 per cent. of nitro-glycerine is necessary to produce the best results, unless the compound is multi-perforated according to our inventions.

"When such a high percentage of nitro-glycerine is employed, the tremendous heat of the products of combustion renders it advantageous to employ some compound rich in carbon, such as oil or vaseline, which shall combine with the excess of oxygen in the products of combustion of nitro-glycerine, and some of the carbonic acid gas formed, reducing a portion to carbonic oxide, thus lowering the temperature of the gases. Still, such compounds have been found, in spite of moderants or reducing agents, to be exceedingly erosive in their action upon the bore of the gun, and to have a high heating effect upon the weapon, a quality which is not possessed in like degree by compounds containing a low percentage of nitro-glycerine. This may be due to some peculiar action of nitro-glycerine in combustion. Possibly the combustion of nitro-glycerine in such high percentage compounds may be somewhat independent of the other ingredients, and occur a little in advance of the combination or reaction of its products of combustion with the gases of the reducing medium. Whatever the cause may be it is nevertheless a fact, that although the temperature of the products of combustion of a high percentage nitro-glycerine compound like cordite, may be lowered by the addition of a reducing agent, like oil or vaseline, to correspond with the temperature of the products of combustion of a pure gun-cotton compound, or one low in nitro-glycerine, still the action of erosion and heating of the gun is far from being correspondingly diminished.

"If nitro-glycerine in a free state, or a body wet or saturated with it, like sawdust or wood meal, as in dynamite, be ignited in the open, it will burn with a peculiar hissing sound, well known to all familiar with the subject.

"Now, if a stick of high percentage nitro-glycerine powder, like cordite, be lighted in like manner, the same hissing sound is produced by its combustion. This seems to indicate that the nitro-glycerine which is held by such a compound in a free state, the same as in dynamite, as water is held by a sponge, is burned independently of the other ingredients, and that whatever reaction takes place between their

separate products of combustion occurs at some later instant, and quite independently of the primary combustion.

"If a smokeless powder consisting wholly of gun-cotton, or of a colloid of gun-cotton with as little as 10 per cent. of nitro-glycerine, be ignited in the same manner, no such hissing sound is produced, which seems to indicate that the character of the combustion is different.

"Some unburned and some partially burned grains of Maxim-Schupphaus smokeless cannon powder were picked up in front of the gun after some experiments in firing the powder in guns too small for the grain employed. When fired under such circumstances, a few of the grains, leaving the gun end on, are blown out by the rush of air through the perforations, due to the rapid velocity of the grain through the air. These partially burned grains illustrate perfectly the action of combustion of this powder in the gun, and demonstrate that the powder is consumed in the gun in the manner and with effects exactly as claimed."

—*United Service Gazette.*

THE BRITISH ARMY.

The General Annual Return of the British army for 1896, prepared by order of the Commander-in-chief and signed by the Adjutant-General, has just been issued as a Blue-book. It states that the average effective strength of the Regular Army, "by arms," in 1896 was 220,742, subdivided thus: Household Cavalry, 1300; cavalry of the Line, 18,284; Horse Artillery, 3785; Field Artillery, 14,451; Mountain Batteries 1408; Garrison Artillery, 17,663; Royal Engineers, 7833; Foot Guards, 5850; Infantry of the Line, 3517; Colonial Corps, 5218; Army Service Corps, 3517; Ordnance Corps, 1210; Medical Staff Corps, 2632; and Army Pay Corps, 569. This same average of 220,742 works out "by ranks" as under: Officers, 7765; warrant officers, 910; sergeants, 14,125; trumpeters, drummers and buglers, 3418; and rank and file, 194,524. Of this force 76,937 of all ranks were quartered in England, Wales, and the Channel Islands, 3630 in Scotland, and 25,841 in Ireland (being an average at home of 106,408) 38,884 in the Colonies and Egypt, and 75,450 in India. The net loss from desertion was again, it is satisfactory to see, in the downward direction, namely, 3367, as against 3443 in 1895, and no fewer than 5523 in 1886. The general total of courts-martial last year was 9167—5241 at home and 3926 abroad—while the aggregate of offenses, including courts-martial, for which sentences were awarded and punishments inflicted was 13,663—8063 at home and 5600 abroad. No death sentences are recorded in last year's return, but there were nine of penal servitude, 1137 of reduction to a lower grade or to the ranks, 7605 of imprisonment, with or without hard labor, and there were only two instances of men being discharged with ignominy without other punishment. Of the cases of penal servitude all occurred abroad, and it is an unsatisfactory feature of the return that of these nine there were five among the cavalry of the Line. There were only three in the infantry

of the Line, and one in the Royal Artillery. The total number of men fined for drunkenness was 14,441, being a proportion of 68 per 1000 of the average strength. It was among the infantry of the Line that this average was by far the highest—viz., 89 per 1000—while in the Household Cavalry it was as low as 2, in the cavalry of the Line 19, in the Royal Engineers 15, in the Colonial Corps 8, in the Army Service Corps 11, in the Ordnance Corps 12, and in the Medical Staff Corps 19, while the Army Pay Corps has the unique distinction of not being debited with a single case.

Turning to a more agreeable side of the picture, it will be found that the number of men serving on January 1 this year who were in possession of good conduct medals was 870, while there were 105,666 who were entitled to wear good conduct badges; indeed, 135 cases are reported of wearers of no fewer than six of these badges. From the section of the report devoted to "ages, heights, and chest measurements," it will be gathered that the army contained 4746 non-commissioned officers and men of 6 ft. and upwards, and 6864 between 5 ft. 11 in. and 6 ft., while there were 6115 instances of chest measurements of 40 in. and over, and 9583 of between 39 in. and 40 in. With respect to the important question of the age of our soldiers, it is officially on record that the proportion per 1000 men under 18 years is now 17, as against 19 in 1884 and 1885, and 16 in 1878 and 1879. Meanwhile, since 1878 the proportion per 1000 men of soldiers over 40 years of age has sunk from 33 to 7. The very common impression that Irishmen form the "backbone" of the British army is rudely dispelled by the figures in this return. As a matter of fact, the army last year contained 159,500 men of English birth, 16,208 of Scottish, and 25,669 of Irish, besides 8058 born in India or the Colonies, and 150 foreigners.

With regard to the Army Reserve, Militia, Yeomanry, and Volunteers, it is stated that Reservists of the first class numbered 78,100 on January 1 of this year, while there were only 82 effectives of the second class, made up of Class 2 of 1867, the Reserve of 1859, and enrolled pensioners. The Militia establishment as laid down in the Army Orders of 1896 was 134,746, but the actual number enrolled fell 16,973 below this, being only 117,773. Of the above, 98,761 were present at training, while 6721 were absent from inspection with leave, 7231 without leave, and 5060 were excused training. The total of the Militia Reserve was 30,374 on January 1 last. At the same date the enrolled strength of the Yeomanry Cavalry was 10,342 (9380 in English and 962 in Scottish regiments); while on November 1 last year the Volunteer Force present at annual inspection, including the staff, showed an aggregate of 204,229. The number of "efficient" was, however, considerably above this figure—namely, 229,034, composed of 7815 officers and 221,219 non-commissioned officers and men. Proficients who had earned the special grant of 50s. were 19,852 in number, and there were 1528 Volunteer officers who had earned the special grant for tactics or

artillery. Besides 40 officers and non-commissioned officers and 20 officers and non-commissioned officers are returned as having earned the special grants for signalling and transport duties respectively.

It only remains to add that the average number of riding and draught horses and mules in the various arms of the service during last year was 27,575, made up of 15,047 on the British establishment and 12,528 on the Indian establishment. Of these, 818 are reported as being attached to the Household Cavalry, 6918 to the cavalry of the Line, 1101 to the Horse Artillery, and 3277 to the other branches of the artillery, while the remainder are distributed among the rest of the service and "unposted remounts."—*United Service Gazette*.

THE GERMAN ARMY.

The Intelligence Department of the War Office has just issued an official handbook of the German army. Major E. Agar, R. E., the compiler, has done his work well. His idea apparently was to set forth in the most concise way and convenient form all the salient points bearing upon the big question of the military organization of Germany. And he has succeeded admirably. The German army in peace-time is, as we know, little better than a training school for the youth of the Fatherland; through it all able-bodied men are bound to pass. On the outbreak of hostilities the number of men who can be called up for service exceeds 3,000,000. They are thus classified: Eighteen contingents of fully-trained men, 2,400,000; three or four years' volunteers, 340,000; one-year volunteers, 103,000: Ersatz Reserve men, 170,000; or 3,013,000 in all. The number of officers at present available, including those of the Reserve and Landwehr, is about 43,400, exclusive of some 5000 officers on half pay, etc. The army is divided into nineteen army corps districts. The army consists at present in war-time of 624 battalions of infantry, 465 squadrons of cavalry, 494 batteries of horse and field artillery, thirty-seven battalions of foot artillery, twenty-three battalions of pioneer corps, seven battalions of railway troops, and twenty-one battalions of train.

It will interest many, doubtless, to have particulars of the uniforms and equipment. Major Agar is careful to give them. Cuirassier regiments have white metal helmets, white trousers and pantaloons, the former with the distinctive facings, jack boots, grey cloaks, and white belts. They no longer wear the cuirass, except in the Guards on special occasions. Dragoons have leather helmets, light blue tunics (dark green in the 23d and 24th Regiments), with distinctive facings and buttons, and the number on the shoulder-strap, dark blue pantaloons, long boots, grey cloaks, and white belts (black in the 23d and 24th Regiments). Hussars have hussar tunics of various colors (scarlet, black, brown, crimson, green, dark blue or light blue), with yellow or white lace, dark blue pantaloons (light blue in 18th and 19th Regiments), fur busbies with bushy bags of distinctive colors, Hessian boots,

grey cloaks, girdle and white belts (black in 17th Regiment). Lancers have "lance caps," dark blue tunics (light blue in the 17th and 18th Regiments), with turnbacks and facings of distinctive colors, and shoulder-scales with regimental number, dark blue pantaloons (light blue in 17th and 18th Regiments), long boots, grey cloaks, and white belts. Bavarian heavy cavalry are dressed similarly to Prussian dragoons. Bavarian lancers have uniforms of the same cut as Prussian lancers, but the color of the tunic is dark green. Bavarian light horse are dressed much in the same way as their lancers, but have spiked leather helmets instead of the lance caps. Saxon heavy cavalry have uniforms of the same cut as Prussian cuirassiers, but the color of the tunic and the pantaloons is light blue.

As regards infantry the tunic for Prussian, Saxon-Württemberg, and Hessian troops is single-breasted of dark blue cloth, with collar and cuffs of scarlet. The shoulder-straps are of various colors and are marked with the number of the regiment, but in a few exceptional cases with the cipher of the chief of the regiment. Guards are distinguished by lace on the collars and cuffs. Bavarian troops wear a light blue tunic with scarlet collars and cuffs, and shoulder-straps with the regimental number. The trousers are of very dark grey cloth with scarlet piping. In Bavarian infantry the color is light blue with scarlet piping. The head-dress is a black polished leather helmet with metal spike and ornaments. The 108th Regiment wears a shako. The greatcoat is at present dark grey, but is shortly to be light grey; the boots are Wellingtons. The uniform of the Rifles (*jägers*) consists of a dark green tunic with scarlet cuffs and collars, and shoulder-straps with numbers. The head-dress is a leather shako.

The armament for cavalry is the same for all regiments: officers, sergeant-majors, vice-sergeant-majors, and trumpeters are armed with sword and revolver; sergeants and under officers with lance, sword, and carbine. Thus in a regiment, twenty-six are armed with sword and revolver, forty-eight with lance, sword, and revolver, and 528 with lance, sword, and carbine. The sword, of course, is of cavalry pattern (1889). The lance is of hollow steel, and is provided with pennon of national color except for under officers, who have special pennons. The carbine is that of 1888 pattern with a calibre of 0.309 in., loaded by packets of five cartridges. The revolver is a six-shooter of 1883 pattern, with a calibre of 0.417 in. (in Saxony a five-shooter of 0.433 in. calibre). Men armed with the carbine carry thirty rounds in the pouch and fifteen in the wallet; those with the revolver eighteen rounds each; four to eight men per squadron are equipped as pioneers. The carbine is carried as with us in a bucket on the off-side of the saddle, almost vertical. The sword is worn on the saddle, and the revolver is carried in a case on the waist-belt or girdle. Ammunition is carried in a pouch slung on to a shoulder-belt and in the wallets. The man's kit is carried in two roomy wal-

lets, and the corn sack and rolled cloak are strapped in rear of the saddle.

The field artillery of Germany consists, in peace-time, of forty-three regiments; Prussia supplies thirty-three regiments, Bavaria five, Saxony three, and Württemberg two. Twenty-three regiments are composed of both horse and field batteries, the remaining twenty being made up of field batteries only. This force represents in all 173 brigade divisions with 447 field-guns and 47 horse batteries, or a total of 494 batteries. Including the two brigade divisions, each of three batteries, at the Field Artillery School of Gunnery, there are 500 batteries. Nothing is laid down officially or semi-officially for the war organization of the field artillery, but from recent manœuvre practice, and from the peace organization, the war organization would probably be, Major Agar presumes, "A fourth brigade division of three batteries. Each army corps will not go into the field, but will be broken up to form a depot and cadres for the reserve formations. Each of the forty-three regiments will take the field with two brigade divisions of three field batteries each only, and will be attached to one of the infantry divisions of the army corps to which it belongs. The remaining batteries will go to furnish the horse artillery for the cavalry divisions (as a rule two horse artillery batteries per cavalry division), and the corps artillery. This latter will probably, as a general rule, consist of six field and two horse batteries. Each regiment of the peace footing mobilizes also a brigade division of ammunition columns, consisting of three artillery and two infantry columns, giving in all forty-three brigade divisions with 129 artillery and eighty-six infantry ammunition columns." All batteries on a war strength consist of six guns, nine ammunition wagons, two battery store, one provision and one forage wagon, and field forge. The "light baggage" consists of first line of wagons (four wagons and officers and spare horses), and second line of wagons (five wagons, one store wagon and officers and spare horses). The remaining wagons form the "heavy baggage." The six guns and first line wagons constitute the "fighting battery." The general principles upon which the German military organization is founded are too well known to call for remark. One only has to read Major Agar's handbook to fully realize what a wonderful war machine the army of the Fatherland is, and what care is taken to render it in every respect effective.—*The Army and Navy Gazette*.

A NEW TENT.

A new tent is to be introduced into the French army, replacing the Waldéjo tent and the old shelter tent. The new tent is to be for individual use. Complete with accessories it weighs 2.37 pounds, while the weight of the Waldéjo tent is 3.39 pounds. The tent cloth is of ordinary cotton treated with impermeable rubber, the length of its sides being 5 feet 3 inches. It is provided with buttons of aluminum instead of zinc. The tent pole, which is of bamboo, is divided into four equal

pieces, provided at the end with metal sockets, which are to fit very tightly, and the little pegs are of soft steel, pointed, and with an arrangement for screwing them into the ground. The cost of this new tent is only 6f. 70c.—*Army and Navy Gazette*.

THE REAR BICYCLE SPROCKET.

There is a strong tendency among bicycle makers in pandering to the public taste for lightness of parts to reduce the size of the sprocket wheel on the rear axle. That this is a mistake is proved by an experiment recently made to determine the comparative efficiency of sprockets of different sizes. To carry out the experiment the bicycle was inverted, and the frame securely attached to the floor. A thin steel band had one end attached to the tire, and the other end carrying a weight which was raised by the band being wound upon the tire, a second weight being hung from a scale pan attached to the pedal, whence the efficiency of the portion of the mechanism transmitting the power could be calculated. A long series of readings were taken with the same large sprocket and with seven, eight and nine toothed sprockets on the rear, and with pedal weights varying from 2 lbs. to 50 lbs. The average efficiencies in each case were as follows: 7 tooth, 89.9; 8 tooth, 91.5; 9 tooth, 93.4. This shows the 8 tooth to have 98.9 per cent. of the efficiency of the 9 tooth, and the 7 tooth to have 96 per cent. of the efficiency of the 9 tooth sprocket, other conditions being equal. The result proves that there is less chain pressure upon the teeth of the larger wheels, and hence less wear.

The friction of bicycle chains is being investigated in the engineering laboratories of Sibley College, Cornell University, under the direction of Prof. R. C. Carpenter, says *Engineering News*. The question of chainless gearing has also received some attention. The results of the tests so far made are unfavorable to all forms of wheels driven by other means than the usual chain. Prof. Carpenter says: "Our investigations are not entirely completed at the present time, but it seems safe to announce that all the tests indicate that no form of gearing can possibly equal the best chain for efficiency and durability." As a result of tests of chains which had been in actual and severe use, it was found that friction varied from 2 to 5 per cent., depending upon the construction and previous use. The highest friction found was 10 per cent., in the case of an old chain which did not fit the sprocket. The friction of a complete wheel was tested under working conditions in several instances and found to vary from 5 to 40 per cent. of the power applied. For high grade wheels this value ranged between 5 and 8 per cent. In all the tests of bevel gears and geared bicycles the chain gear was found more efficient than the other forms. Another feature adding to the success of the chain in competition with chainless wheels is that the friction remains practically constant at all loads, while with the geared wheel the friction is greatest when the load is greatest.—*Scientific American Supplement*.

THE ARTILLERY OF JAPAN.

Lieutenant A. W. Pack-Beresford, R. H. A., who has recently been travelling in Japan and the Far East, contributes to the December issue of the "Proceedings" of the Royal Artillery Institution the following very interesting article on the artillery of the Japanese army:—

During May of this year I found myself in Tokio, the capital of Japan. I had some time on my hands, so I thought I would make a call on the officers of the Japanese artillery. I proposed to my guide that we should go to the artillery barracks, and that he should introduce me, but he was horrified at the idea, and said such a thing had never been done before. He tried to dissuade me, but at last, after a consultation with the hotel keeper, he said if I insisted on going, I had better first go and see Colonel Fukushima; the Colonel, he told me, had travelled all over the world, and could talk English, besides about six other languages. I gave in so far, but was rather startled when I was taken to the War Office of Japan. However, it turned out to be the best thing I could have done. I was only kept waiting two or three minutes after I sent up my card, when Colonel Fukushima came to see me in person. He most courteously promised to send a War Office interpreter to my hotel next day, who would take me to the barracks and show me everything I cared to see. He was as good as his word, and next morning Mr. H. Kakogi came to call for me and took me off to the barracks. I found that the bulk of the artillery were at a practice camp about forty miles away, which I subsequently got leave to visit. I will first note down what struck me as regards their personnel and equipment, and then describe what I saw at the camp.

The artillery is at present divided into seven regiments, of which the artillery of the Imperial Guard is one. It was this regiment to whose camp I went. The artillery is considered a *corps d'elite* in Japan, and the best officers and men are selected for it. The artillery of the Guard may be taken as a fair type of a regiment of artillery. In equipment and organization they are all on the same footing. The regiment is commanded by a colonel. It is divided into three squadrons, each with a commander, and each of these again is divided into two batteries. The battery contains three sections and six guns, the officers correspond to ours in their duties and posts; but there is no fifth wheel. The commander of the squadron is responsible for the tactics and target of the batteries. The captain of the battery fights it, trains it, and is responsible for its personnel and fire discipline.

The gun is made of gun metal. The breech is closed by a side-actioned interrupted screw breech-block. It is locked by a nut on top. All the guns are made in the arsenal at Osaka. It seemed to be curious that a nation so up to date as Japan should not have a steel gun. But I was told that they import steel rods from France for their rifle barrels, and, no doubt, they cannot trust themselves to work in steel yet; so prefer a reliable bronze gun to an uncertain steel one. In most details

of equipment, such as handspikes, fuses, shells, vents, etc., they are so much like us that it is scarcely worth noting the difference, but the heads of the sights were unlike any I had seen. The fore-sight and tangent scale have similar heads. The tangent scale has a small window and a deflection leaf which the fore-sight has not. To lay the gun you look through the window of the tangent scale, and get the object between two points of the fore-sight. I tried myself, and it seemed to me to be very easy to lay with. One cannot tell all about a gun by looking at it, but I should think it was about the same in power as our 2.5 inch gun. Perhaps somewhat below it.

The harness is not cleaned at all according to our ideas, but all the leather is soft and the working parts oiled. They have breast harness and rope Australian girths. The riding horse has a bit and the off horse is led in a snaffle. They have flat traces, and the lead and centre set a direct pull on the swingle tree. Wallets, shoepockets, whips, etc., all like ours. The kit is carried on the off horse in two large saddlebags. They have pole draught. Three men ride on the limbers and two on the axletree seats. The Nos. 1 and officers ride. The guns can do about five or six miles an hour. They are not expected to work with cavalry. The horses are stout cobs about 14.1 high. They are the stamp of our Exmoor ponies, but they are rather lacking in bone below the knee. Bad-tempered horses are castrated, all the others are entire. Mares are not used. They get a ration of eleven pounds of hay and two gallons of barley. They are groomed and fed twice a day. All the horses I saw were in good condition, and well turned out. In camp they are tied up to a picket rope 2 feet 6 inches high, with two head ropes. No heel ropes are used. The horses are cast for age at fourteen. The men are very well trained, the gunners go to laying and the drivers to riding-school every day. I saw a lot of men laying, and they seemed to carry out their instructions as we do.

I travelled down to Narashchino Camp with Mr. Kakogi. I found him a most interesting companion. He had been present at one or two of the naval fights in the China war. He told me that Captain Mahan's book had been translated in Japanese, and that he had read it. About an hour's rail took us to the camp. A sergeant met us, guided us to where Colonel Kumamoto was, and I was introduced to him. The Colonel told me I had come on a very good day, as it was the first day they were to fire live shell. Directly after I arrived the series began. I don't quite know what I expected, but I was fairly astonished at what I saw. I might have been at Okehampton once again. The battery which was going to fire was under cover about four hundred yards in rear of its position. When the Colonel gave the order it was brought up under cover and halted behind the crest of a hill. The guns were run up by hand. The whole thing is just as we do it. The range-finders were on a flank; an officer was sketching the position. The battery commander observed for himself and bracketed his target and

rapped out his alterations in elevation as smartly as possible. The Colonel with a course of officers (including a cavalry officer) was looking on from a little way off. The sergeant-major was keeping the range-book. The limbers were taken away under cover, till the series were finished. The fire discipline was very good indeed. They fired a series of eighteen rounds, and took about ten minutes to do it. They were not working against time, as it was the first day.

After the series was over, the commander of the battery had up the layers and Nos. 1, and criticised the practice to them. When he had finished, the Colonel gave a short lecture to him and the other officers on the morning's work. The battery had fired at an unknown range, which proved to be about 1300 metres. The target was very indistinct, but the range had been found and some effective shrapnel got in. I was introduced to Lieutenant Shekuni Soga, who had been ten years in France. He very kindly showed me round the lines and barracks, but my French was so lame, halting, and mixed with Hindustani that I was not able to grasp all the information he gave me. After I had seen all there was to see, the Colonel gave me some refreshment in his hut. I asked him some questions about the practice, and he at once referred to the range report which he had been working out, and told me what I wanted to know. The batteries had been in camp for two weeks, and as they had only twenty rounds per gun, they had spent those two weeks in drill and practice with blank, and only in the last week did they use their live shell. I was very much struck with the thoroughness of everything I saw.

I went to the harness store and saw all the spare harness, carefully put away in soap and oil. All the working parts of the gun are most carefully oiled and looked after. Of laying, which we have only come to consider vital during the last ten years, they do more than we do. I could not tell whether the shooting was good or what the power of the gun was. But I am quite sure that whatever faults they have they see and will make it their business to rectify very quickly, and that though their gun may not be very mobile and be of low power, they will get the utmost of that power out of it. The artillery is being augmented by one quarter. I was, when I went to Japan, under the impression that it was a very small country, but the following figures open one's eyes: The area of Great Britain is one hundred and twenty thousand square miles, and its population is thirty-nine millions; the area of Japan is one hundred and sixty thousand square miles, and its population is forty-one millions. Add to this that those forty-one millions are saturated with an ardent and burning patriotism—that they are led by an aristocracy whose ideas of honor and self-devotion are equal to ours—and that in power of organization they are admitted to be behind no race in the world. Consider all this, and one must admit that the nation of Japan will be a very vital factor in any war in which it decides to take part.

—*United Service Gazette.*

Comment and Criticism.

I.

"Federal Duty and Policy as to Organizing and Maintaining an Adequate Artillery Force for the United States."

1st Lieut. E. M. Weaver, 2d U. S. Artillery.

REFERRING to the article of Lieutenant Carbaugh in the September number of the JOURNAL, I would like to make a few comments on one particular feature of his discussion. On page 259 Lieutenant Carbaugh says: "There are those who assert that volunteer organizations, such as members of the National Guard of the States, or otherwise, can be organized and trained in time of peace so as to be immediately effective in case of war. * * * The danger attending these schemes is that on the one hand the amount that would be learned by such organizations, and the training they would receive, even if it were possible to organize them, would result—by lack of continued artillery employment—in inefficient organizations, and on the other hand, would cultivate in the country an unjustifiable reliance on such organizations for defense and furnish an excuse for not maintaining an adequate permanent federal artillery force."

During the past two years I have had quite an interesting experience in a professional way, with the militia in heavy artillery work, and as it has a bearing on that portion of Lieutenant Carbaugh's article which I have quoted, I shall venture to give some account of it.

In January, 1896, General Samuel Dalton, Adjutant General of the State of Massachusetts, requested the commanding officer of Fort Warren (Lieutenant-Colonel Carle A. Woodruff, 2d Artillery) to coöperate with him in giving instruction in coast artillery work to one of the infantry regiments of the State. Colonel Woodruff readily consented, and the First Regiment of Infantry was then assigned to coast artillery work by the Adjutant General, to the exclusion of all infantry work. Colonel Woodruff detailed me to assist in giving instruction.

The subject of coast defense and the sphere of artillery in connection therewith was first presented to the officers of the regiment in the form of a lecture. Then other lectures were given as follows:

1. Duties, organization, equipment and instruction of coast artillery.
2. The elementary instruction of the artillery soldier.
3. Instruction of gunners.
4. The fortress in action.

The object of these lectures was to place the subject, with some attention to the details of the work, before the officers, so that they might have some conception of the nature of duty assigned to the regiment. They at once took a deep interest in the subject and began the study of the heavy artillery manual with much earnestness.

It was planned that the regiment should be given a week's encampment at Fort Warren in August of that year (1896) and, with a view to preparing the men for the practical work at the fort, a series of "exercises" was drawn up as a guide for captains; these exercises are given in the accompanying order:

COMMONWEALTH OF MASSACHUSETTS.

ADJUTANT GENERAL'S OFFICE.

SPECIAL ORDERS, }
No. 24. }

BOSTON, Feb. 21, 1896.

By direction of Lieut.-Colonel Carle A. Woodruff, United States Army, Lieut. E. M. Weaver has submitted a schedule of drills for the First Regiment of Infantry, M. V. M., in heavy artillery.

Careful instruction in the above exercises will be given by officers to non-commissioned officers and privates. These exercises will form the basis of the drill programme to be carried out at Fort Warren during the next encampment, as indicated in connection with the heading of each exercise. Officers will be expected to take charge of and carry out the requirements of any sub-heading, under any exercise, which may be assigned to them.

(Numbers in parenthesis indicate paragraphs in Tidball's Manual, edition of 1880.)

First Exercise.

1.—March the battery to the guns (106-107). 2.—Post the cannoneers at the guns (108). 3.—Take Equipments (109) (278 for 10-in. S. B. gun) (295 for 15-in. S. B. gun) (310 for 8-in. M. L. rifle). 4.—Change posts (112). 5.—Service of the guns (276 to 286 for 10-in. S. B. gun) (294 to 308 for the 15-in. S. B. gun) (321 to 340 for the 8-in. M. L. rifle). 6.—General rules (230).

Second Exercise.

1.—Cordage, pulleys, blocks and tackle (476 to 484). 2.—The service of gins (486, siege gin, to 495, garrison and casemate gin). 3.—The use of the sling cart (502-503). 4.—The hydraulic jack and its use in mechanical manœuvres (522 to 529). 5.—Blocks, skids, etc., used in mechanical manœuvres (528 to 532).

Third Exercise.

1.—Post the detachment for mechanical manœuvres (415). 2.—Dismount barbette gun with the gin (497) (498) (499). 3.—Mount barbette gun with the gin (499) (498) (497). 4.—Dismount barbette gun by means of blocks, etc., (542) (543) (544). 5.—Mount barbette gun by means of blocks, etc., (544) (545) (542).

By order of the Commander-in-chief,

SAMUEL DALTON,
Adjutant General.

The field and company officers entered heartily into the new work. Dummy guns of wood of full size were mounted at one end of the large drill hall on bar-bette carriages, at which the service of the piece could be fully carried out. Reduced sized guns, blocks, and other mechanical appliances were devised, by means of which *the methods* of mounting and dismounting guns could be practiced in the company instruction rooms on dummies of reduced size. Instruction in the application of pulleys and tackle was also given on a reduced scale in the company instruction rooms.

The floor of the armory drill hall in front of the full-size dummy guns was large enough to lay off on it an exact reproduction of the field of fire at Fort Warren to a scale of $\frac{1}{10}$. A miniature ship about $\frac{1}{10}$ full size was placed in this artificial field of fire, and as it was moved from point to point its track was plotted, and instruction in predicting was given. This good practice was had in all features of position finding, ship tracking and predicting. At the same time the men at the guns worked the guns exactly as in regular target practice, both by the direct and indirect method, it being possible by assuming a theoretical flight of the projectile to even plot the splashes of a hypothetical shot.

It thus became possible to put into operation within the limits of the large armory *the methods* employed in every feature of the work laid out for the regiment at Fort Warren in August.

When the regiment came to Fort Warren in August there were men in each company who could read fairly well the azimuth circles and do the work at the plotting board, and all of the men knew fairly well the service of the 8. in rifle, cordage, and the principles of the "Exercises" in mechanical appliances and mechanical manœuvres.

The work during the encampment was laid out a month before the regiment came to the fort. A schedule of drills was drawn up which enabled each captain to know the precise occupation of his company throughout the entire week. The placing of the drill schedule in the hands of captains beforehand was found to be advantageous in many ways. The schedule is given herewith:

HEADQUARTERS FIRST REGIMENT OF INFANTRY.

FIRST BRIGADE, M. V. M.

CIRCULAR }
No. 1. }

SOUTH ARMORY, BOSTON, July 9, 1896.

The following schedule of drills having been arranged by Lieut.-Col. Carle A. Woodruff, Commandant at Fort Warren, for the coming tour of duty of this command, will be strictly followed by officers and enlisted men:

1. Batteries will form on battery streets five minutes before the schedule hour for drill and be marched at once to the place appointed for the drill.

2. Instructors will so conduct drills, as to leave pieces, materials and equipments in proper position, condition and form for the succeeding battery to begin the drill.

3. The instructor in charge of drill during the fifth period, each day, will make all things secure for the night at the end of the drill.

4. The drills at the guns (8-inch rifle, 10-inch and 15-inch smooth-bore) will include the following:—

1. Description of the piece, carriage and ammunition, and nomenclature of parts of the piece and carriage.

2. Post cannoneers at the piece.
3. Change posts of cannoneers.
4. Service of the piece.
5. March from the battery.
5. Drill in cordage will include the following:—
 1. Make the square knot; the bowline knot; round turn and half hitch; timber hitch; blackwall hitch; catspaw; sheepshank.
 2. Worm and serve a piece of rope; whip the end of a rope; make a short splice; a long splice; eye splice; grommet; strap.
 3. Apply stop lashing; nipper lashing; a screw; seizing; a mousing; a shear lashing.
 4. Sling a barrel on end; on side.
 5. Reeve a gun tackle purchase; luff tackle; runner tackle; a single Burton; a whip on whip.

The battery will be divided into gun detachments and each detachment will be instructed by its non-commissioned officers under the supervision of the battery officers.

6. The drill in mechanical manœuvres will include the dismounting of a 10-inch gun on barbette carriage by means of blocks and remounting it; also the dismounting and remounting of a 10-inch barbette gun by means of the gin.

7. In case a battery is not able to complete this drill in its drill period, the following battery will take up the drill at the point arrived at and carry it on from that point.

8. The drill in the use of mechanical appliances will include the following:

First Detachment.—Service of the siege gin: assemble the gin; reeve the fall; raise the gin; move the gin; dismount a siege gun; mount a siege gun (see paragraphs 486 to 491, Tidball's Manual); lower the gin; take the gin apart.

Second Detachment.—Use of sling-cart: sling siege mortar mounted on its carriage and transport it; sling sea-coast mortar on garrison sling-cart.

Third and Fourth Detachments.—Use of capstan and hydraulic jack: place 15-inch gun on cradle and transport it.

9. Magazine instruction will include the preparation of cartridges and projectiles for the guns.

10. Target practice will include five rounds of solid shot from the 8-inch rifle, as follows:

1. Three rounds at fixed target at 3600 yards range.
2. Two rounds at moving target.

11. Field officers will inspect daily the work of the batteries of their respective battalions. They will report to the colonel in writing at the close of each day the result of the day's work. In making this report each field officer will state the manner in which each battery has performed the work assigned to it, mentioning in detail, in a special way, any particularly meritorious work, and likewise mentioning any failure to attain a proper degree of proficiency or any exhibition of lack of application.

By order of

COLONEL MATHEWS.

OFFICIAL:

First Period for Drill, 7.30 o'clock A. M. to 9 o'clock A. M. Second Period for Drill, 9 o'clock A. M. to 10.30 o'clock A. M. Third Period for Drill, 10.30 o'clock A. M. to 12 o'clock M. Fourth Period for Drill, 2 o'clock P. M. to 3.30 o'clock P. M. Fifth Period for Drill, 3.30 o'clock P. M. to 5 o'clock P. M.

BATTERY	DRILL PERIOD.	MONDAY.	TUESDAY.	WEDNESDAY.	THURSDAY.	FRIDAY.	SATURDAY.
A	I.	15-in.		Cordage.		Mechanical Appliances.	Athletic Sports.
	II.		Magazine Instruction.		15-in.	Cordage.	
	III.	Mechanical Appliances	Target	8-in.		Alarm and	
	IV.	8-in.	Practice.	10-in.	Mechanical Manœuvres.	Combat Drill	
	V.						
B	I.	8-in.	10-in.		8-in.	15-in.	
	II.		Magazine Instruction.	15-in.			
	III.		Target	Cordage.	Mechanical Appliances.	Alarm and	
	IV.	Mechanical Manœuvres	Practice.		10-in.	Combat Drill.	
	V.						
C	I.	10-in.		Target		8-in.	
	II.		8-in.	Practice.	Cordage.	Mechanical Appliances.	
	III.	Cordage.		15-in.		Alarm and	
	IV.		Magazine Instruction.	Mechanical Manœuvres	10-in.	Combat Drill.	
	V.	15-in.					
D	I.		8-in.	Target	15-in.		
	II.	Cordage.	Mechanical Manœuvres.	Practice.		Mechanical Appliances.	
	III.		Magazine Instruction.	8 in.	10-in.	Alarm and	
	IV.	10-in.			Cordage.	Combat Drill	
	V.						
E	I.	Mechanical Manœuvres.		Magazine Instruction.		15-in.	
	II.	8-in.	Mechanical Appliances.	Target	8 in.	10-in.	
	III.		Cordage.	Practice.	Mechanical Appliances.	Alarm and	
	IV.	10-in.		15-in.		Combat Drill.	
	V.						
F	I.		15-in.		Mechanical Appliances.		
	II.	Mechanical Manœuvres.	10-in.	Magazine Instruction.	15 in.	8-in.	
	III.	15-in.		Target		Alarm and	
	IV.		Cordage.	Practice.	8-in.	Combat Drill.	
	V.						
G	I.		Cordage.	10-in.		Cordage.	
	II.	15-in. S. B.		Magazine Instruction.	10-in.	Mechanical Manœuvres.	
	III.		8-in.	Target	15-in.	Alarm and	
	IV.	Mechanical Appliances.	Mechanical Manœuvres.	Practice.		Combat Drill.	
	V.						
H	I.	8-in.		Mechanical Appliances.	Target		
	II.		15-in.	Cordage.	Practice.	Cordage.	
	III.	Mechanical Manœuvres.		Magazine Instruction.	8-in.	Alarm and	
	IV.	Cordage.	10-in.		Mechanical Manœuvres.	Combat Drill.	
	V.						
I	I.		Mechanical Appliances.	10-in.	Target	10-in.	
	II.	10-in.	15-in.	Mechanical Manœuvres.	Practice.	15-in.	
	III.			Magazine Instruction.	8-in.	Alarm and	
	IV.	Cordage.	8-in.			Combat Drill.	
	V.						
K	I.	Cordage.		8-in.	Magazine Instruction.	10-in.	
	II.		10-in.		Target		
	III.	10-in.	15-in.	Mechanical Manœuvres.	Practice.	Alarm and	
	IV.	Mechanical Appliances		Cordage.	15-in.	Combat Drill.	
	V.						
L	I.		Mechanical Manœuvres.			Mechanical Manœuvres.	
	II.	Mechanical Appliances.	Cordage.	8-in.	Magazine Instruction.	Mechanical Appliances	
	III.	8-in.		15-in.	Target	Alarm and	
	IV.		10-in.		Practice.	Combat Drill.	
	V.						
M	I.	Mechanical Appliances.		15-in.	10-in.		
	II.	15-in.	Cordage.	10-in.	Magazine Instruction.	8-in.	
	III.				Target	Alarm and	
	IV.	Mechanical Manœuvres.	8-in.	8-in.	Practice.	Combat Drill.	
	V.						

This programme was carried out in all its parts except the firing was all at a fixed target. All witnesses, both Regular officers and militia officers, agreed that the work was faithfully and well done. At the close of the encampment, it is not too much to say, that both officers and men would have been able to render valuable service in the defense of the coast. They had taken a long step toward making themselves efficient artillerymen.

During the encampment a large number of State officials visited the fort, including the Governor and several members of the Military Committees of the State Legislature. They were men so impressed by the value of the work done by the regiment that a bill was introduced in the Legislature and passed during the winter of 1897, changing the First Regiment of Infantry into the First Regiment of Heavy Artillery.

As soon as the regiment found that it was thus to be permanently assigned to coast defense work, it renewed with vigor the work of the previous year. The same general methods were followed. Preliminary instruction was given in the armory in the *methods* and *principles* of all features of the schedule, using the full sized and reduced sized mechanical appliances and dummy guns.

An effort was made to differentiate the instruction in each battery into four distinct divisions, which seemed to be naturally suggested by the work involved in fortress defense, namely :

1. The service of the guns.
2. Transmission of information.
3. Range and position finding.
4. The defense of the mine field.

The first and third divisions were those which had been studied and practiced the first year. The second and fourth divisions had not then received any special attention. The preliminary armory instruction under the first and third divisions was conducted along the lines followed the previous year. In June captains of batteries were directed to organize in a permanent way in their respective batteries signal squads and boat crews. These instructions were carried out, and by the time the regiment came to Fort Warren (August 8, 1897) there were well drilled boat crews and signal squads in most of the batteries.

The schedule for the week's practical work at Fort Warren was published the last of June, giving the captains two months in which to study the precise nature of the work laid out for them and to work up their men to as high a standard as possible.

The first part of the schedule and the tabulated programme of hours of drill were essentially the same as the first year. The new features of signal instruction and mine field defense were provided for as follows :

11. The captain of each battery will organize a signal squad in his battery, to consist of one lieutenant, one sergeant, one corporal and six privates. The names of the members of the squad will be sent to the adjutant of the regiment some time previous to August 1.

Instruction in signaling will be given to these squads during the encampment according to the following schedule :

SIGNAL DRILL SCHEDULE.

		BATTERY SQUADS.											
		A.	B.	C.	D.	E.	F.	G.	H.	I.	K.	L.	M.
		Monday and Wednesday.						Tuesday and Thursday.					
HOURS	FOR	7.30 to 8.30 A. M.	8.30 to 9.30 A. M.	9.30 to 10.30 A. M.	10.30 to 11.30 A. M.	2.00 to 3.00 P. M.	3.00 to 4.00 P. M.	7.30 to 8.30 A. M.	8.30 to 9.30 A. M.	9.30 to 10.30 A. M.	10.30 to 11.30 A. M.	2.00 to 3.00 P. M.	3.00 to 4.00 P. M.
SIGNAL	DRILL.												

The signal squads will report to the chief signal officer at the hours specified.

Night signaling with torch, Tuesday night; long-distance signaling with flag, Wednesday; boat patrol of sub-marine, mine, field and night-alarm drill, Thursday night.

12. The regimental signal corps will practice torch signaling on Tuesday night, between 8 and 10 o'clock. Long distance signaling will be practised on Wednesday, at such time as the chief signal officer may appoint. At the close of the encampment the chief signal officer will make a written report of the work of his corps to the regimental commander.

13. The captain of each battery will select a boat's crew from his battery and send the names thereof to the adjutant of the regiment. The crew will consist of one lieutenant, one sergeant, one corporal and eight privates. The crews of all the batteries will be instructed in small-boat drill according to the following schedule:

BOAT DRILL SCHEDULE.

		BATTERY CREWS.											
		A.	B.	C.	D.	E.	F.	G.	H.	I.	K.	L.	M.
		Tuesday and Thursday.						Monday and Wednesday.					
HOURS	FOR	7.30 to 8.30 A. M.	8.30 to 9.30 A. M.	9.30 to 10.30 A. M.	10.30 to 11.30 A. M.	2.00 to 3.00 P. M.	3.00 to 4.00 P. M.	7.30 to 8.30 A. M.	8.30 to 9.30 A. M.	9.30 to 10.30 A. M.	10.30 to 11.30 A. M.	2.00 to 3.00 P. M.	3.00 to 4.00 P. M.
BOAT	DRILL.												

In order to have some practical work in mine-field defense, it was arranged that a small-boat patrol should be maintained throughout one night as would be required in time of war. To the end also of making the experience as prac-

tical as possible, a scheme of attack and defense was drawn up, and carried out after the manner and in the spirit of a war game. The instructions prescribing and regulating this portion of the programme were as follows :

HEADQUARTERS FIRST REGIMENT HEAVY ARTILLERY.

FIRST BRIGADE MASSACHUSETTS VOLUNTEER MILITIA.

FORT WARREN, B. H., Aug. 7, 1897.

CIRCULAR }
L. }

PATROL DRILL FOR THURSDAY NIGHT.

1. The mine field to be patrolled will be limited by the following lines :—
From *Bug Light* to the *Basket Beacon*, thence across the channel to *Black Buoy No. 5*, thence to *Black Buoy No. 7*, thence to *Bug Light*.
2. Four boats will be employed in the patrol, two on station and two at the landing.
3. There will be two boats' crews on patrol duty constantly from 7 o'clock P. M. Thursday, until 4 o'clock A. M. Friday. The boats' crews of batteries will report for duty in accordance with the following schedule :—

HOURS FOR BOAT PATROLS.

CREWS.	Hour to report at Landing.	Hour to report at the Mine Field.
E and F.....	6.40 P.M.	7.00 P.M.
D and G	8.10 "	8.30 "
A and L.....	9.40 "	10.00 "
K and H.....	11.10 "	11.30 "
C and B.....	12.40 A.M.	1.00 A.M.
I and M.....	2.10 "	2.30 "

4. No crew will leave the mine field until its prescribed relief has arrived thereon and the commander of the relief has formally relieved the old patrol of its duties and received from the commander of the old patrol any information or suggestions he may have to give bearing upon the duty.

5. New patrols will relieve old patrols as follows :—

D Battery patrol relieve	E Battery patrol	} 8.30 P.M.
G " " "	F " " "	
A " " "	D " " "	} 10.00 "
L " " "	G " " "	
K " " "	A " " "	} 11.30 "
H " " "	L " " "	
C " " "	K " " "	} 1.00 A.M.
B " " "	H " " "	
I " " "	C " " "	} 2.30 "
M " " "	B " " "	

6. The instructions for boat patrols as given on pp. 19-26 of Captain Board-

man's pamphlet on "Submarine Mines, Their Attack and Defense," will govern all patrols.

7. The sergeant of the boat's crew will ride in the bow of the boat, and, under the direction of the patrol commander, will make all challenges. The sergeant will challenge as follows: "*Boat ahoy! HALT!*" The patrol will run at once toward the suspected boat, and the usual requirements as to countersign will be demanded and observed. *The challenge should be made as far as can be seen and heard.*

8. Each member of the crew will be armed. The privates will have their rifles and a supply of blank cartridges. The officers and non-commissioned officers will carry revolvers and have blank cartridges.

9. On sighting any craft whatever, its character will be ascertained as quickly as possible. If, on investigation, it proves to be one of the enemy's boats, it will be attacked at once with small arms. If the attacking boat come under the fire of a defense boat for one minute at a range less than fifty yards, it will be considered captured.

10. As soon as the patrol commander decides that the boat challenged belongs to the enemy, or as soon as he decides to open fire on her, he will send up a rocket as signal to the shore that the enemy is tampering with the mines. He will then, as soon as possible, run in to the shore to get out of the way of the fort guns which may be opened on the mine fields.

11. The Naval Brigade detachment, with row boat or steam launch, will be the attacking party. An attempt will be made by the detachment to cut out a passage through the mine field twice during the night, once before midnight and once after midnight. The attacking party is at perfect liberty to choose the time, direction and manner of attack.

12. If the attacker be challenged by the patrol, he may resort to any means that would be legitimate in war to evade, deceive or defeat the patrol. The patrol will make the challenge as far as a suspected boat may be seen and the challenge heard thereon. No attack will be made by either defense or attack with firearms unless within fifty yards of each other.

13. The speed of all boats within the mine field will not be greater than two knots at any time; that is, the average speed of row boats.

14. A number of small, light buoys will be anchored over the mine field suitably labelled and numbered for identification. The attack will be considered successful if five consecutively numbered buoys be brought in by the attacking boat.

15. If the attacking boat get within twenty-five yards of a single patrol boat before being discovered, the latter will be considered captured and be debarred from firing or giving a signal of any kind.

16. The chief of mines will be the final referee and determine all disputed questions.

17. The defense will select an umpire to go aboard the attacking boat, and the naval detachment will select an umpire, to represent the attackers, to go with each patrol boat, if it so desires. These umpires will note all claims made, which must be made without delay to be considered.

18. A false signal to the fort by the patrols will be considered as giving three buoys to the attacker, of such numbers as he may choose. The attacker will at once come in and make the claim to the chief of mines, through the umpire on the attacking boat. The attack and defense will then be resumed.

19. A true signal to the forts is a complete defeat of the attack.
 20. During a change of patrols the attackers may be challenged by either old or new patrol, as long as either is in the guarded area.
 21. The adjutant will detail the umpires for the patrols and attacking boat in accordance with the selections made by each party, and will notify these umpires respectively of the hour and place they are to report for duty, and on which boat they will serve as umpires.
 22. A copy of these directions will be carried by each patrol officer, the officer in charge of the attack and each umpire.
 23. Each patrol officer will get the countersign and parole for the patrol service from the chief of mines before seven o'clock Thursday night.
 24. The chief of mines will see that the dummy mines are put in place before sundown Thursday.
 25. During Thursday night the sub-marine mine field of the fort will be patrolled by the battery boat crews, under the direction of a patrol officer to be appointed by the commanding officer of the regiment.
- The time for each crew to report for duty will be designated by the adjutant of the regiment. In connection with this patrol duty a night alarm will be sounded and the guns manned.

CHARLES PFAFF,
Colonel.

Official :
FREDERIC S. HOWES,
Adjutant.

This patrol drill was, of course, purely in the nature of an experiment. It proved most interesting and suggestive. Owing to the moonlight the defense had a great advantage and was able to detect the attacking boat some distance before it reached the limits of the mine-field. On a dark or misty night, or in fog, the conditions would be much more even and the contest would be certainly very exciting and the result doubtful.

In connection with the service of the guns an "Alarm Drill" was devised. The idea was, that each man and officer of the regiment should have his place in action prescribed definitely, and that on the sound of the alarm each should proceed at a run directly to his place of duty and await there further orders. It was considered that the "service of the piece" included the prompt and continuous supply of ammunition as well as the loading and laying of the gun, and therefore each battery was so assigned to guns as to preserve this unit of work.

The instructions governing the alarm drill were as follows :

HEADQUARTERS MASSACHUSETTS ARTILLERY.

FIRST BRIGADE, M. V. M.

CIRCULAR }
No. K. }

SOUTH ARMORY, BOSTON, Aug. 7, 1897.

ALARM DRILL.

The drill will take place at such time as the Commanding Officer may order. At the sound of the "Alarm," all officers and enlisted men will immediately run to the positions prescribed and await orders.

ORGANIZATION.

Captain in command of Battery.

First Sergeant.....with Captain,

Musician.....	with Captain.
Private.....	" "
".....	" "
".....	" "

FOR SERVICE OF GUNS,

Lieutenant.....	in charge of Gun Service.
Sergeant.....	Chief of 1st Detach. 1st Gun.
Corporal.....	Gunner " " " "
Private.....	Cannoneer No. 1 " "
".....	" 2 " "
".....	" 3 " "
".....	" 4 " "
".....	" 5 " "
".....	" 6 " "
".....	" 7 " "
".....	" 8 " "
".....	" 9 " "
".....	" 10 " "

FOR SERVICE OF GUNS.

Sergeant.....	Chief of 2d Detach. 2d Gun.
Corporal.....	Gunner " " " "
Private.....	Cannoneer No. 1 " "
".....	" 2 " "
".....	" 3 " "
".....	" 4 " "
".....	" 5 " "
".....	" 6 " "
".....	" 7 " "
".....	" 8 " "
".....	" 9 " "
".....	" 10 " "

Instructions for cannoneers will be those prescribed in the Heavy Artillery Drill Manual.

FOR SUPPLY OF AMMUNITION.

Lieutenant.....	in charge of Ammunition Supply.
Sergeant.....	Chief of Powder Detachment.
".....	Chief of Projectile Detachment.
Corporal.....	Magazine Corporal.
".....	Projective Corporal.
Private.....	Service Magazine Assistant.
".....	Powder Carrier No. 1. } For 1st Gun.
".....	" 2. }
".....	" 3. } For 2d Gun.
".....	" 4. }
".....	" 5. } Between main
".....	" 6. } and service
	magazine with
	hand cart

Private	Projectile Carrier No. 1.	} <i>From main supply to 1st Gun.</i>
"	" "	
"	" "	
"	" "	
"	" "	} <i>From main supply to 2d Gun.</i>
"	" "	
"	" "	
"	" "	
"	Projectile Handler.	
"	" "	
"	Supernumerary.	
"	" "	
"	" "	

DUTIES OF OFFICER IN CHARGE OF SUPPLIES.

He will see that an ample supply of both powder and projectiles is prepared for the cannoneers at the guns, and that a continuous and regular supply is maintained during the firing. At the sound of "Alarm" he will see that all enlisted men take promptly the posts assigned, and at "Commence Firing" that the operations prescribed are carried out.

DUTIES OF CHIEF OF POWDER DETACHMENT.

He will see that a charge of powder is on hand in rear of each gun immediately after firing; that the powder carriers move promptly to and from the guns, and between the magazines; that the magazine corporal and assistant perform their functions properly, and observe all precautions against explosion; that all members of his detachment perform their duties in a quiet, prompt and military manner. As soon as possible after the "Alarm," he will inspect the squads of his detachment, verify their numbers, and report any absentees to the officer in charge.

DUTIES OF CHIEF OF PROJECTILE DETACHMENT.

He will see that ten shots and ten shells are at all times piled near each gun; that this number is maintained as far as possible during the firing. He will see that the projectile carriers move the projectiles as quickly as possible; that they keep together returning from the gun empty handed, and move at double time if necessary. He will see that the projectile corporal has the shot properly prepared, and will himself, if possible, examine each projectile before it is turned over to the cannoneers. He will do as prescribed for the chief of powder detachment at sound of "Alarm."

DUTIES OF MAGAZINE CORPORAL.

When powder is in the service magazine, he will see that it is safely and properly stored. At the sound of "Alarm" he will run directly to the magazine, open the door and stand ready to issue powder, if so ordered by proper authority, or if the signal "Commence Firing" be sounded. He will examine each cartridge carefully, measure its length and mark it on the side. See that each bag is well shaken down to a compact mass, that the choke is closely and securely tied and cut off at two inches from the twine. He will direct and instruct the powder carriers in their duties. The magazine assistant will run to the service magazine and stand ready to assist the corporal.

DUTIES OF PROJECTILE CORPORAL.

At the sound of "Alarm" he will run to the main supply of projectiles, supervise the formation of the projectile carriers, and hold them in readiness for transporting the projectiles. At the call "Commence Firing" he will have two projectiles prepared for the guns and send at once one to each gun, and, during the absence of the carrying squads, he will have two others prepared. He will see that each projectile is thoroughly wiped and cleaned with an oiled rag before forwarding; that the carriers observe their proper positions when carrying, and that they perform their duties promptly and quietly.

DUTIES OF POWDER CARRIERS.

Nos. 1 and 2 will run directly to the magazine at the "Alarm," get a pass-box, stand at attention ready to receive and carry a cartridge to first gun, and return at once to magazine for another. Nos. 3 and 4 will do the same, except to carry the cartridge to second gun. Nos. 5 and 6 will run to the main magazine, and stand ready to carry cartridges to the service magazine if ordered.

DUTIES OF PROJECTILE CARRIERS NOS. 1, 2, 3 AND 4.

No. 1 at the "Alarm" will get a carrying bar and hasten to the main supply of projectiles; 2, 3 and 4 will run directly to the main supply, fall in at attention and await instructions. They will carry to the first gun, taking regular positions at the carrying bar. No. 5 does as explained for No. 1, and Nos. 6, 7 and 8 as explained for Nos. 2, 3 and 4. except they will carry to the second gun.

DUTIES OF PROJECTILE HANDLERS.

They will run at "Alarm" to the main supply of projectiles and stand ready to assist the corporal.

Supernumeraries will report at once to the battery commander. Vacancies will be filled by detail from supernumeraries.

At "Cease Firing" further supply of ammunition will be suspended, and all will resume their first positions when signal sounds.

At "Recall" unexpended powder will be returned to the service or main magazine. Projectiles in transit will be carried to the gun or main supply, whichever is nearer.

All those passing to and from the guns will keep to the right in passages and steps.

In case the "Alarm" be sounded at night the chief signal officer will see that the routes to and from the guns are illuminated, and the magazine corporal and projectile corporal will provide such lights for their detachments that the work at the magazines and projectile supply may be carried on.

CHARLES PFAFF,

Official :

Colonel.

FREDERIC S. HOWES,

Adjutant.

Two alarms were sounded, one in the afternoon of Friday, August 13, and one between eleven and twelve o'clock Friday night. At each alarm blank cartridges were fired, after the men and officers had taken up their respective positions, at the call "Commence Firing." Both alarms were intended to be surprises to the men. The first was not a complete surprise, the second was, however. In the latter case the men were roused from their sleep, many of them, and had to

dress en route to their places. It was less than four minutes from the first note of the alarm till all were in their places and the "Commence Firing" was sounded.

In the mechanical manœuvres the 10-inch S. B. gun was dismounted and mounted four times in four days by means of blocks; and using the gin and Mills's hitch, each battery dismounted the gun several times within a drill period of one and one-half hours.

In cordage the men were, as a rule more expert than Regulars, due probably to the large number in ranks who were familiar with boats and ship cordage.

The work at the plotting board, that at the ends of the base line with azimuth circles, the signaling and the target practice was all performed in the most creditable manner. Since all of these divisions of work are employed together in target practice and the latter depends for efficacy upon the efficiency of all the others, it is sufficient to state the results of the target practice to appreciate the good work of all divisions.

Each battery was allowed five shots from the 8-in. converted rifle. The first three were fired at a fixed target at 3950 yards to 4000 yards. The last two at a drifting target at all ranges within the field of fire, varying from 2700 yards to 4125 yards. At the fixed target, out of 36 shots fired 17 pierced the standard vertical plane target ($210' \times 35'$); that is almost one-half. At the moving target the firing was by my own indirect method. The target was plotted at minute intervals and the prediction was made for two minutes. Out of 24 shots fired 8 pierced this vertical plane. As this was the first time the men at the azimuth circles and plotting board had ever worked at a moving target there was considerable inaccuracy of angle reading and predicting at first, but when the method was once understood and a little practice had, the shooting was as good at the moving target as at the fixed target. Out of the last six batteries only one failed to put one of its two shots through the vertical plane and the last battery put both shots through.

It should be clearly understood that no Regular officer or soldier was present at either the azimuth circles or the plotting board. I was present at the gun, and confined my instruction to explaining the manner of using my method of indirect fire, and to giving the gunners some few general directions in firing at the fixed target, but the sighting was all done by the militia gunners.

Having recited the facts connected with this work of the militia of Massachusetts in heavy artillery, it is pertinent now to inquire if Lieutenant Carbaugh and General Wingate have not been led to underestimate the "powers and potencies" of our National Guardsmen in this class of work? Is it to be thought that there is "danger attending the amount that would be learned by such organizations and the training they would receive"? I am sure all Regular artillerymen along the coast would be glad to know that they had behind them a body of men like those of the Massachusetts Heavy Artillery Regiment.

It is well understood by the officers and men of the militia that they are not to displace the Regular artillery from the coast forts, nor need it be feared that those who study and practice the work of coast defense are going to be satisfied with a smaller Regular artillery force than could be had if they were not in existence.

On the contrary, it is precisely in the minds and hearts of such coast artillery Reserves that we shall find the most powerful advocates and warmest supporters of all questions pertaining to the proper defense of the coast. Instead

of being a means of "furnishing an excuse for not maintaining an adequate permanent federal artillery force," we shall find, rather, that through them, through their influence and the influence of their votes we shall get, if we ever do get, the equipment and organization which an adequate defense of the coast demands.

It is a grievous mistake to suppose and does harm to assert that it is dangerous to instruct the militia in coast defense work. If it be true of heavy artillery, why is it not equally true of the naval reserves? The adequate defense of the coast is an undertaking of ample dimensions to provide a place for all the Regular artillery that the most generous Congress will ever give and still, when war comes, leave us looking with longing eyes from our island forts toward the mainland and praying for a Coast Artillery Reserve.

Massachusetts has taken the first step in providing such a Reserve. Just as she was the first State to appreciate the necessity of a Naval Reserve so she is the first State to provide a regiment of heavy artillery, a body of soldiers set apart as an auxiliary reserve force, designed to come to the assistance of the Regular forces stationed along her coast line. It is to be hoped on all grounds that her example in this particular will be followed by other seaboard States as it has been in that of the Naval Reserves.

II.

"The National Guard, National in Name Only."

Harry C. Kessler, Colonel 1st Inf'ty, N. G. M.

IT is not with any intention of prolonging the discussion to which the article of Colonel Frazier published in the JOURNAL, has given rise, but with the desire to place the National Guard of Montana in their true position before the public, and to refute the assertion made that "in none of the States is either the enlisted man or the officer obligated by the terms of his enlistment or oath of office to serve the United States," that I make this statement.

The military code of Montana provides:

That "The Militia of the State shall with certain exceptions consist of all able bodied male citizens between the ages of eighteen and forty-five years."

That "the enrollment shall be made annually, and a copy furnished to the Governor."

That "The Governor is Commander-in-chief *except when these forces are in the actual service of the United States.*"

That "The regularly enlisted, organized and uniformed active militia shall be styled the National Guard of Montana, and shall be subject at all times to the order of their officers."

That "The uniform of the National Guard shall be the prescribed uniform of the United States Army, with the exception of the buttons."

That "The organization of brigades, regiments, battalions, squadrons and companies shall be the same as that prescribed for the United States Army."

That they shall take the following oath: "I do solemnly swear that I will support the constitution of the United States, the constitution and laws of the State of Montana, and that I will obey all lawful orders of my superior officers for the period of my service." (The term of an enlisted man is three years, while the commission of an officer is continuous.)

That "The rules of the discipline and the regulations of the Army of the United States shall so far as the same may be applicable, constitute the rules of discipline and the regulations of the National Guard of this State, and the rules and articles of war established by Congress and the War Department for the United States shall be adopted so far as applicable for the National Guard of this State, and the drill regulations prescribed for the different arms and corps of the United States Army, shall be followed in the military instruction and practice of the National Guard of this State, and the use of any other system is forbidden."

That "in case of war, insurrection or rebellion, or of resistance to the execution of the laws of this State, or upon the call or requisition of the President of the United States * * * the Governor may order into active service any portion of the whole of the National Guard, or enrolled militia."

That "Any member of the National Guard who neglects or refuses to rendezvous at the designated place when ordered out by the Governor is guilty of disobedience of orders, and may be tried and punished by a general court-martial."

Our code is not perfect, nor has the Guard reached that condition but in the event of war, should a call for troops be made by the President, every officer and enlisted man in the National Guard of Montana will respond immediately or will render himself liable to the penalty prescribed by Sec. 21 of the Articles of War, *i. e.*, to suffer death or such other punishment as a court-martial may direct."

I think these quotations will show that the troops of this State are obligated to serve the United States, and are National in every sense of the word, excepting that in times of peace they are not in the actual service of the National Government.

Reviews and Exchanges.

Military Handbook.*

IN his preface the author states that he "undertook the preparation of this book with the hope of being able to place at the disposal of the officers and enlisted men of the National Guard of Pennsylvania, a compendium of information on certain subjects, a knowledge of which would facilitate the performance of the routine duties of the Guard and possibly create a desire for further research."

"No pretence whatever of originality is made, and any value the book may have must arise from the absence of State Regulations for the government of the National Guard of Pennsylvania, and from the fact that officers in the state service have but little time to devote to study, and cannot therefore avail themselves of the many valuable text-books that are now so readily procurable."

It is "recommended for the guidance and instruction of the National Guard of Pennsylvania in all matters not otherwise prescribed by competent authority," by the Governor and Commander-in-chief. It is by this means practically "The Regulations" for the National Guard of that State.

Under the subject of "Military Duty," an Act of Assembly, April 13, 1887, Sec. 65, provides, "and that, while on such duty, or going to and returning from the same, obedience shall be rendered to all rules, regulations, usages, customs, and requirements of the Army of the United States and of the code and regulations of the State of Pennsylvania," consequently the Army Regulations are adopted so far as they apply. In addition there is much information culled from other well known works on Military Law, Tactics, Fire Regulations, Hygiene, Cooking, etc., and when necessary decisions of Courts, and opinions expressed in orders on doubtful points.

Much of the service of this branch of our Forces has been in "Riot Service," the article of five pages on this subject if thoroughly understood and carried out by the officers of the National Guard, without regard to State, would add much to their efficiency, and in many cases save much trouble and annoyance.

The book, which consists of but two hundred and sixty pages, should be in the hands of at least every officer, if not the enlisted men, of the National Guard, and if possible measures should be taken to acquaint them with its contents.

J. F.

Manual of Physical Drill.†

One result of the general interest manifested in the last few years in military gymnastics is the appearance of a Manual of Physical Drill, the use of which in

* *Military Handbook*. Prepared for the use of The National Guard of Pennsylvania. By Major H. C. Groome, Assistant Adjutant General, First Brigade, N. G. P. Hallowell Co., Ltd. Philadelphia, Penn. 1897.

† *Manual of Physical Drill, United States Army*. By First Lieut. E. L. Butts, 21st Infantry, U. S. Army. D. Appleton & Co., N. Y.

the army has recently been authorized in a circular from the A. G. O. The Author, Lieut. E. L. Butts, 5th Infantry, when in charge of the physical training of recruits at Columbus Barracks, Ohio, made a thorough study of army athletics, and is well fitted to supply the service with an authoritative manual on the subject. That his knowledge is not of a theoretical order alone is made clear by a glance at the illustrations of the Manual, for which he acted as a model.

In the arrangement of his subject, Lieut. Butts has with good judgment graduated the exercises progressively from simple to complex, and with great gain in space and no loss in clearness, has relied on a multitude of well executed illustrations in half-tone, reproduced from instantaneous photographs, to supply details of movements and positions, elaborate descriptions of which are wisely omitted in the text.

The division of the Manual naturally falls into three parts: The first includes calisthenics and exercises without apparatus, or with such simple equipment as the dumb bell, Indian club, bar bell and rifle; the second deals with more difficult exercises with the horizontal and parallel bars and all the other gymnastic paraphernalia; and the third is an interesting chapter on athletic games and contests. This last, though not strictly a part of the Manual, is valuable in picturing to the athletically ambitious young soldier some of the world's most famous athletes in the act of performing their various specialties, and will be of service to the former in any attempted imitation of the example set before them.

The author has avoided crowding his book with a mass of theoretical suggestions and cautions, with which similar works are too often over-laden. He has devoted a few paragraphs to some practical suggestions such as may be followed and carried out by the soldier and this is all. His page devoted to a ten-day programme of exercises in detail will be found useful to instructors who have had but little experience in such work.

H. C. A.

Announcements.

THE Board of Award selected to consider the merits of the essays submitted in competition for the prize of 1897, have rendered their report, awarding the prize of the Institution to 1st Lieutenant S. M. Foote, 4th U. S. Artillery, for the best essay on the following subject :—" Based on Present Conditions and Past Experiences, How Should Our Volunteer Armies be Raised, Organized, Trained and Mobilized for Future Wars."

The essays of Captain W. A. Glassford, Signal Corps, U. S. Army, and Captain William Baird, 6th U. S. Cavalry, received first and second honorable mention, respectively.

IN accordance with the requirements of Article IX. of the Constitution, a Committee of the Executive Council has had under consideration the desirability of modifying Section 7, Article IV. Further details regarding this matter will be submitted to the Members of the Institution for their consideration.

THE Members and Associate Members of the Institution are respectfully informed that the annual general meeting, called for by Article VI. of the Constitution, will be held at Governor's Island, N. Y. H., at 3 P. M. on the 12th day of January, 1898.

EX-PRESIDENT GROVER CLEVELAND, Brig. Gen.
S. B. HOLABIRD, U. S. Army, Retired, Col F. V.
GREENE, N. G., S. N. Y. will constitute this year's
board of judges to award the hundred dollar prize and
gold medal, offered annually by the U. S. Infantry
Society. As heretofore announced, the subject of the
essay for this year's competition is

“The Infantry of our Regular Army ; Its History,
Possibilities and Necessities.”



Prize Essay—1898.

I.—The following Resolution of Council is published for the information of all concerned :

Resolved, That a Prize of a Gold Medal, together with \$100 and a Certificate of Life Membership, be offered annually by THE MILITARY SERVICE INSTITUTION OF THE UNITED STATES for the best essay on a military topic of current interest, the subject to be selected by the Executive Council, and \$50 to the first honorably mentioned essay. The Prizes will be awarded under the following conditions :

1. Competition to be open to all persons eligible to membership.
2. Each competitor shall send three copies of his Essay in a sealed envelope to the Secretary *on or before September 1, 1898*. The Essay must be strictly anonymous, but the author shall adopt some *nom de plume* and sign the same to the Essay, followed by a figure corresponding with the number of pages of MS.; a sealed envelope bearing the *nom de plume* on the outside, and enclosing full name and address, should accompany the Essay. This envelope to be opened in the presence of the Council after the decision of the Board of Award has been received.
3. The prize shall be awarded upon the recommendation of a Board consisting of three suitable persons chosen by the Executive Council, who will be requested to designate *the Essay deemed worthy of the prize*; and also in their order of merit those deserving of honorable mention.
In determining the essay worthy of the prize, the Board will be requested to consider its professional excellence, usefulness and valuable originality, as of the first importance, and its literary merit as of the second importance. Should members of the Board determine that no essay is worthy of the prize, they may designate one or more essays simply as of honorable mention; in either case, they will be requested to designate one essay as first honorable mention. Should the Board deem proper, it may recommend neither prize nor honorable mention. Should it be so desired, the recommendation of individual members will be considered as confidential by the Council.
4. The successful Essay shall be published in the Journal of the Institution, and the Essays deemed worthy of honorable mention shall be read before the Institution, or published, at the discretion of the Council.
5. Essays must not exceed twenty thousand words, or fifty pages of the size and style of the JOURNAL (exclusive of tables).

II.—The Subject selected by the Council at a meeting held Sept. 11, 1897, for the Prize Essay of 1898, is

"OUR WATER BOUNDARIES AND OUR INTERIOR
WATER-WAYS; HOW TO UTILIZE AND DE-
FEND THEM; THEIR INFLUENCE IN CASE OF
INVASION."

III.—The gentlemen chosen by the Council to constitute the Board of Award for the year 1898 are :

REAR ADMIRAL BANCROFT GHERARDI, U. S. N.

BRIG. GENERAL WILLIAM P. CRAIGHILL, U. S. A.

HONORABLE JOSEPH H. OULTWAITE.

GOVERNOR'S ISLAND,
Nov. 1, 1897.

JAMES FORNANCE,
Secretary.

The Military Service Institution.

President.

Major-General NELSON A. MILES, U. S. Army.

Resident Vice-Presidents.

Major-General WESLEY MERRITT, U. S. A.

Bvt. Brig.-Gen. T. F. RODENBOUGH, U. S. A.

Secretary.

Capt. JAMES FORNANCE, 13th U. S. Infantry.

Treasurer.

Lieut. J. C. BUSH, 5th U. S. Artillery.

Asst. Secretary.

Capt. H. L. HARRIS, 1st U. S. Artillery.

Vice-Treasurer.

Lieut. F. W. FUGER, 13th U. S. Infantry.

Executive Council.

Term ending 1903.

BRECK, S., Brig.-Gen., Adjutant-General.
EDMONDS, F. H., Capt. 1st U. S. Infantry
FIEBIGER, G. J., Prof. U. S. Mil. Academy.
GLENN, GEO. E., Col. A. F. M. G.
HUGHES, R. P., Colonel, Insp.-General.
WOODRUFF, C. A., Major, Sub. Dept.

Term ending 1901.

(Vacancy.)
BREWER, H. F., Major U. S. A.
HALE, H. C., Lieut. 20th U. S. Infantry.
KNIGHT, J. G. D., Major Corps Engineers.
MYRICK, J. R., Major 5th U. S. Artillery.
RODGERS, JOHN I., Col. 5th U. S. Artillery.

Term ending 1899.

Finance Committee.

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CORBIN, H. C., Col. A. G. Dept.
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PATTER, W. S., Major Q. M. Dept.
PHIPPS, F. H., Major Ordnance Dept.
WEBB, A. S., Bvt. Major-General (late) U. S. A.

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Major KIMBALL.
Capt. FORNANCE.
Lieut. FUGER.

Publication Committee.

Majors KNIGHT and MYRICK, Capt. EDMONDS, and Lieut. BUSH.

Branches

are established at West Point, Fort Leavenworth and Vancouver Barracks.

Membership dates from the first day of the calendar year in which the "application" is made, unless such application is made after October 1st, when the membership dates from the first day of the next calendar year.

"An Entrance Fee of Five Dollars (\$5) shall be paid by each Member and Associate Member on joining the Institution, which sum shall be in lieu of the dues for the first year of membership and on the first day of each calendar year, thereafter, a sum of not less than Two Dollars (\$2) shall be paid as annual dues. Annual dues commence on January 1st in each year."

NOTE.—Checks and Money Orders should be drawn to order of, and addressed to, "The Treasurer Military Service Institution," Governor's Island, New York Harbor. Yearly dues (\$2.00) include Journal.

Changes of address should be reported promptly.